China Well-known Trade Mark
China Famous Brand

SHUANGLIANG

ABSORPTION CHILLER PRODUCT CATALOGUE

Flue Gas Operated
LiBr Absorption Chiller/Heater

Hot Water Operated
LiBr Absorption Chiller

Steam Operated
LiBr Absorption Chiller

Direct Fired
LiBr Absorption Chiller/Heater

SHUANGLIANG
ECO-ENERGY

Content

There's Only One Earth, So there's a Responsibility.

At least till today we still only have one earth for living, but obvious climate change in recent years linked to greenhouse gas emission reminds human being that immediate measures should be taken to protect our planet well. From Kyoto Protocol, Copenhagen Agreement to Cancun Climate Conference the world has been working hard to promote applications of energy saving solutions and green energy so that reduce emission of greenhouse gas.

Acting as one of effective solutions for this purpose, Lithium Bromide Absorption Cooling technology adopts non-volatilization, non-deterioration and pollution-free solution of Lithium Bromide as working medium, recover waste heat existed widely in industrial and commercial area as major driving source for chilled water production, not only helping to raise efficiency of energy consumption but also reducing emission significantly.

Since foundation in 1982, in 28 years Shuangliang Eco-Energy Systems Co., Ltd have been devoting in supplying solutions and products of energy saving and environmental protection based on Lithium Bromide Absorption Chiller/Heat Pump on below milestones,

- **In 1985** produced the first LiBr absorption chiller
- **In 1992** drafted the Chinese national standard for LiBr absorption chiller
- **In 1994** set up the only one state-level enterprise technology center for absorption cooling technology in China
- **In 2001** the only one Postdoctoral Scientific Research Work Station was set up
- **In 2003** became the only one public listed company in LiBr absorption chiller industry of China in stock exchange market.
- **In 2009** Installed the largest LiBr Absorption Heat Pump project of the world in China
- **In 2010** developed the first unit of triple effect direct fired LiBr absorption chiller in China

Green heart, Green future is slogan to represent target of Shuangliang, also indicates responsibility we shall take, so we not only develop Libr absorption technology for cooling but also spread its application to heating by heat pump, not only adopt common hot water and steam to drive chiller but also expand driving heat source to waste heat and green energy (solar and geothermal) , not only play role as leading absorption chiller manufacturer, but also upgrade to comprehensive solution provider of energy saving, fresh water saving and producing by absorption chiller/heat pump and new developed air cooled condenser, seawater desalination systems, provide economically feasible solutions to help more and more companies to realize their responsibilities on energy saving and emission reduction.

In past 25 years, Shuangliang provided the community with over 20,000 units of energy saving equipments, brought not only significant savings in electricity supply, the equivalent of saving investment on rare 15×600MW thermal power plants, but also annual savings of 22.5 million tons of standard coal, emission reducing of 57.6 million tons of CO_2 and 85,000 tons of SO_2, equivalent to replant 160,000 hectares of forest every year.

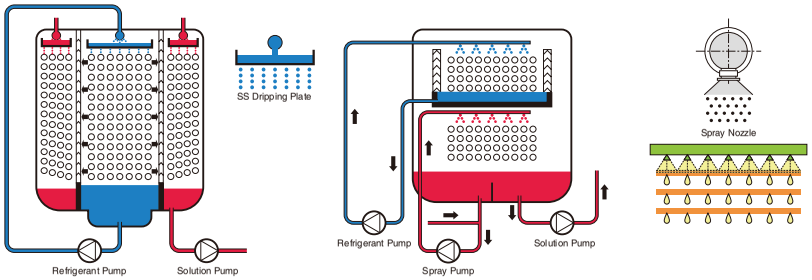
There's only one earth, so there's a responsibility, for a cleaner and greener earth we need to work together, expect our solutions can win your trust too..

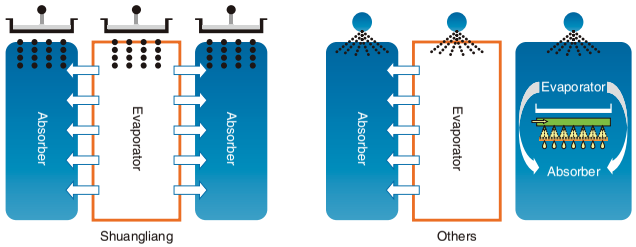
Features of Product

Pioneering technology have been used to ensure the advanced features of chiller

1. Pioneering a chiller with two pumps and without spray nozzles solves the degradation of cooling capacity forever.

Shuangliang constructed the first in China absorption chiller with two pumps and without spray nozzles, which eliminates the rapid degradation of cooling capacity. In order to attain the aim, a chiller with two pumps and without nozzles is manufactured with the knowhow, such as Left-Middle-Right arrangement of absorber-evaporator-absorber, absorber with dripping plates instead of spray nozzles, which don't need solution spray pump. With this technology, the chiller can be operated for much longer time.





2. Solution heat exchanger with new construction and flow pattern improves chiller energy efficiency and reduces fuel consumption.

Heat exchangers are designed with new tubes and their supports, furthermore with new flow pattern, that leads to improve heat transfer and reduce flow pressure drop. These measures improved chiller energy efficiency and reduced fuel consumption.

3. Distribution of refrigerant by dripping plates improves chiller energy efficiency and reduces fuel consumption.

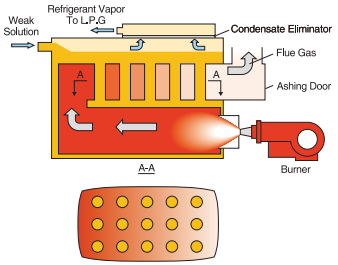
The special form of distribution of refrigerant by dripping plates improves the wetting of tubes by refrigerant, fully uses the heat transfer area, reduces the refrigerant film thickness, increases the heat transfer effects, and results in improvement of chiller energy efficiency and reduction of fuel consumption.

4. New tubes and their arrangement in evaporator improves chiller energy efficiency and reduces fuel consumption.

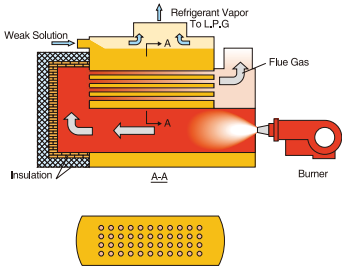
Application of new tubes and their arrangement in evaporator makes more even distribution of heat transfer effect, and thus to improve chiller energy efficiency and reduce fuel consumption.

5. Special construction of high pressure generator improves chiller reliability and energy efficiency, and reduces fuel consumption.

High pressure generator with solution inside tubes and wet back of combustion chamber improves chiller operation safety, and reduces fuel consumption.



Flow Chart of H.P. Generator (Water Tube)



Flow Chart of H.P. Generator (Fire Tube)

6. Heating by evaporator improves heating efficiency and safety of operation

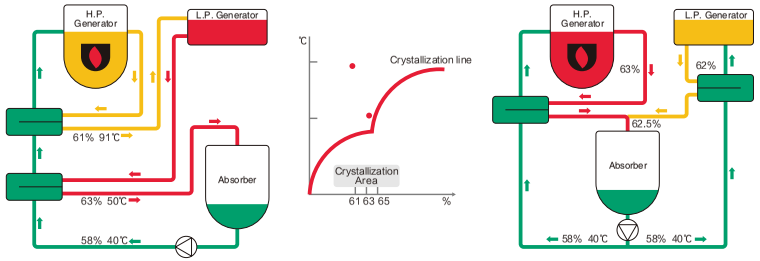
Heating by evaporator improves heating efficiency to 92.5% and improve the operation life.

7. Evaporator tubes are protected from freezing to improve the chiller reliability.

Evapotator tubes are protected from freezing with such measure, as chiller can stop cooling very quickly. It is realized by interruptting the operation of refrigerant pump, if failure of power or chilled water occurs, because refrigerant water from condenser is collected in the sump of evaporator, and pumped to the dripping plate for distributing over tubes.

8. Serial flow of solution to improve chilller reliability.

Serial flow of solution in chiller makes solution far from crystallization line to improve chiller reliability and simplify the control of chiller.



9. Pioneering non-condensable gas purging during heating improves the chiller reliability.

The direct fired absorption chiller can be purged during heating mode by pioneering technology to improve the chiller reliability and improves chiller operation life.

All these patented technologies and other pioneering knowhow are implemened aiming at making the chiller operation more efficient, reliable and easier.

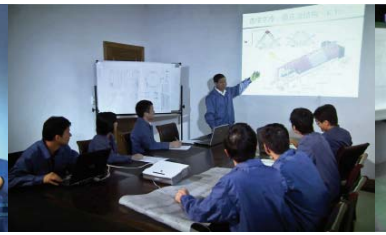
DFM technology

The DFM technology guarantees the world advanced production quality

DFM technology is one of the advanced technology to cover the needs of customer. Shuangliang meets the requirements of customer by zero defect and shortest delivery period by DFM technology and quality management system.

Quality of Shuangliang products are guaranteed by several hundreds of imported equipments, such as plasma cutting machines, horizontal and vertical machine centers, numerical controlled drilling and mill centers, welding robots and helium leak detectors, and all performance test stands.




















DFM

DEMAND FOLLOWS MANUFACTURING

High Air-Tightness

The Decisive Factor to Guarantee the Quality of Lithium Bromide Absorption Chiller

Lithium bromide absorption chiller is operating under high vacuum, which would be impaired by leaking of air into the chiller and non-condensable gases generated inside of the chiller due to corrosion. Poor vacuum will reduce chiller cooling capacity and even increase the corrosion of metal parts in chiller. So high air-tightness is the decisive factor to guarantee the quality of lithium bromide absorption chiller, and the key parameter for evaluation of chiller characteristics.

Two special measures are adopted to improve the air tightness of Shuangliang absorption chillers:

(1) The chiller and its parts have been inspected by helium mass spectro leak tester with leakage rate of 1×10^{-10}Pa·m^3/s, which is 4 order lower than 2.03×10^{-6}Pa·m^3/s specified by Japanese Industrial Standard JISB8662-1994. The rigid leak tester applied by Shuangliang is the only equipment used in absorption chiller industry in the world. During visiting Shuangliang, a famous atomic expert said, "Shuangliang has the same leak testing facility as used in atomic industry".

(2) A patented automatic purging unit is installed on the chiller to purge out non-condensable gases during operation ensuring the vacuum in the chiller.

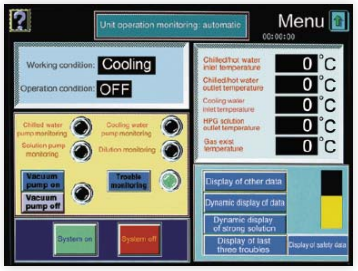
With High Air Tightness Brings Valued Pay Back

(1) The degradaton of cooling capacity is solved in the possible way;

(2) High reliable operation with less maintenance and repair cost is guaranteed;

Intelligent Control System

Quick Man-Machine Dialogue Interface



Data-setting

Data, such as chilled (hot) water outlet temperature, can be set in accordance with the requirements to ensure the operation of unit in the predetermined or optimized operation conditions.

Control mode selection

Auto/ Manual control mode can be selected by pressing the touch screen with the aid of instruction indicated on the screen.

Protection from mis-operation or ill intention

Operator without password is refused to re-set the operation data, and unit is protected from mis-operation or ill intention.

Operation record searching

The memory of control system stores the operation data for last five failures of unit and normal operation for one week, which can be accessed at every moment.

Guidance to operation and maintenance

Display of special working principles and guidance to operation and maintenance enables operators to more rapidly and directly understand the operation method and maintenance information, facilitating the unit management by users and prolonging the service life of the unit.

Timer for Automatic Switch on/off

By pre-setting, without limitation, the switch-on/off timer on the touch screen or centralized monitoring computer, the unit can be automatically started or stopped at the preset time.

Automatic Interlocked Connection of External Units

Chilled (hot) and cooling water pumps and fans for cooling tower can be operated automatically only by connection of control wires with the control panel of unit. In such conditions, full automatic start and stop of chilled (hot) and cooling water pumps and fans for cooling tower will be set.

Limit Control

More considerate way of control:
Running control—limit control—safety protection control.
When chiller's normal running endangered, the self-diagnosis and self-adjustment function will carry out to ensure stable and safe operation.

Reliable and Easy Centralized Control System

Central control of units, such as automatic change-over, central control, storage and print-out of operation data of parallel operated units, and etc. can be realized by means of a computer with the software MMI2 for centralized control developed by the company. In such a way, the computer automatically displays the operation data and conditions, troubles and alarm signal and starts or stops the units, when the load increases or decreases, and the energy consumption can be saved. The control functions are optional for order.

Flexible Connection with Centralized Control of Buildings

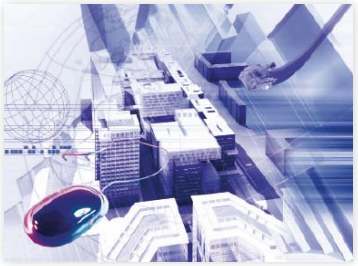
The central control of a building is supported by the control system. The unit control panel is provided with interfaces RS232, RS422 or RS485 and data communication protocol for acquisition and displaying of the operation data and control of the unit realized by the control system of a building. The control functions are optional for order.

Remote Monitoring System for Real Time Supervision of the Operation System

The start and shutdown of unit can be realized by pressing the Start/Stop buttons in the control room remotely and the operation status can be displayed through indicator lights to operate and know the unit data without the need to be on the site. Under special requirement, the touch screen can be installed in the control room to know the operation status of the unit and operation data and information of each part of the unit anytime, thus to monitor the unit on a real time basis as well as to store and print the operation data.
The company's monitoring and control center is able to carry out patrol inspection on the units located in the users' machine room to know and analyze the operation status of the units anytime. Should there be any abnormity during the operation, the control system will automatically dial and connect to the company's monitoring and control center and the service engineer responsible for this unit by sending out failure information.
The control functions are optional for order.

Inverter Control of Cooling Water Pump for Stable Operation and Saving of Energy

The cooling water flow can be adjusted in accordance with the operation mode of unit by means of the Inverter, which control the operation of water pump. In such a way the consumption of energy by the pump can be saved, and unit can be operated under lower temperature of cooling water. Then the unit can be operated under full load even at lower temperature of cooling water. The control functions are optional for order.



Intelligent Control System

Shuangliang Company uses the most advanced in the world color touch screen as the man-machine interface. The operator can start or stop the unit or learn the basic operation, maintenance and acquisition of operation mode and data merely by touching the screen in accordance with the instruction displayed. Man-machine dialogue by touch screen will make the operation of Shuangliang made units easier and more accessible.

Concentration Limit Control

The solution concentration control, specific to the company, allows the unit to operate under high concentration safely and stably by monitoring the spray concentration of the strong solution and controlling the heating capacity, thus not only to prevent crystallization but also to improve the operation efficiency of the unit.

Advanced Analog Adjustment of Cooling (Heating) Capacity

Chilled (hot) water outlet temperature, controlled by analog system, which is specific for the company, can stabilize at high precision, improving the operation efficiency of the unit and more suitable for places that are highly temperature-sensitive.

Solution Pump is Controlled by Means of Inverter

The Inverter control of solution pump is adopted in the control system, makes the unit operate under best solution flow to improve the operation efficiency and reduce the start time and energy consumption.

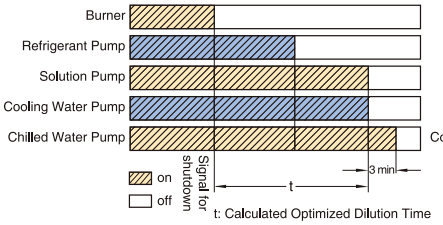
The Limit Control for Cooling Water Temperature

The control system provides with cooling water inlet temperature limit control makes the unit safe operation in the limits of cooling water temperature in the range of 18℃~34℃.

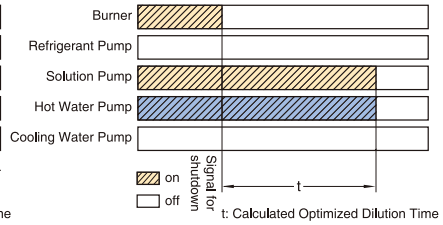
Favorable Dilution Cycle

The control system monitors the concentration of sprayed strong solution to calculate the optimized dilution cycle to far away from preferred solution concentration during shutdown, thus not only to prevent crystallization but also to decrease the re-start time.

Dilution Process During Shutdown under Cooling Mode



Dilution Process During Shutdown under Heating Mode



Failure Management System

When failure of the unit occurs, the location, reason and remedy of failure shall be displayed by means of interface, thus makes operator to treat the failure conditions easily and quickly, and improve the operation efficiency of the unit. The control system also automatically keeps in the memory operational data in a week and contents of last 5 failures as well as various parameters for check at anytime.

Real-Time Display of Operation and Easy to Understand

The control system adopts the advanced PID control technology and touch screen LCD to display the operation conditions and data of the unit in a real-time manner with both texts and pictures, featuring direct expression of contents and easiness for understanding, enabling the operator to know the operation conditions anytime and to take timely measures in emergency.

Specific Working Principle and Operation and Maintenance Instructions Displaying

This function ensures that the operator can understand the unit easily and rapidly thus to well manage the unit and greatly improve the life of the unit and guarantee the increase of efficiency for users as well.

Display of Parameters

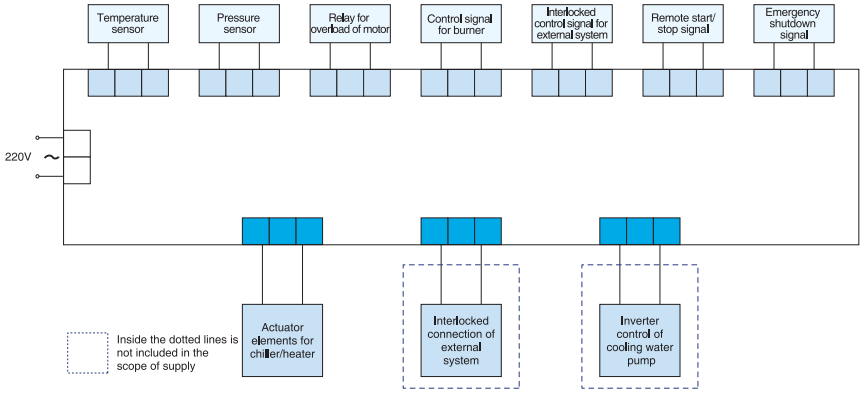
Data Display	Chilled (hot) water inlet temperature	Evaporating temperature
	Chilled (hot) water outlet temperature	Flue gas temperature
	Cooling water inlet temperature	HPG pressure
	Intermediate solution temperature from HPG	Pressure of auto purging unit
	Concentrated solution temperature from LPG	Chiller operation time
	Strong solution spray temperature	Vacuum pump start/stop number
	Condensation temperature	Strong solution dynamic
	De-crystallizing pipe temperature	

Working principle	Cooling flow chart	Heating flow chart
	Working principle of chiller	Working principle of heater

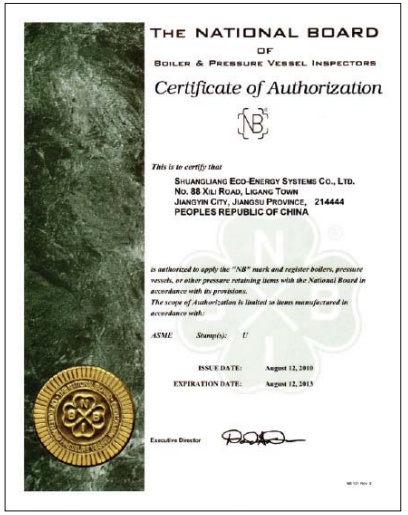
Operation instructions	Operation of chiller	Refrigerant by-pass
	Operation of heater	Leak test of unit
	Operation of chilled (hot) and cooling water pumps	Solution charge
	Burner operation	Removal of solution from unit
	Operation of vacuum pump	Rotation direction test for canned motor-pumps
	Sampling of refrigerant	Change of valve sealing rings

Maintenance instructions	Routing maintenance	Cooling	Unit
			System
		Heating	Unit
			System
	Long term shutdown		

Control System Diagram



Certificates



Our Customers

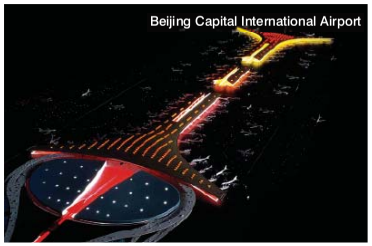
With about 100 sales and service branches around the world, we keep zero distance with customers.
Being sold in more than 100 countries and regions, over 20,000 absorption chillers are serving global customers well.


National Olympic Sports Center


Government Campus Plaza, Trinidad & Tobago


Dolmen City Pakistan


Milan Linate International Airport


Beijing Capital International Airport

Migros Regional Headquarter in Bern (Switzerland)


Chashma Nuclear Power Plant Pakistan


Lefay Resort & Spa Lago di Garda(Italy)

1 Flue Gas Type Lithium Bromide Absorption Chiller/Heater

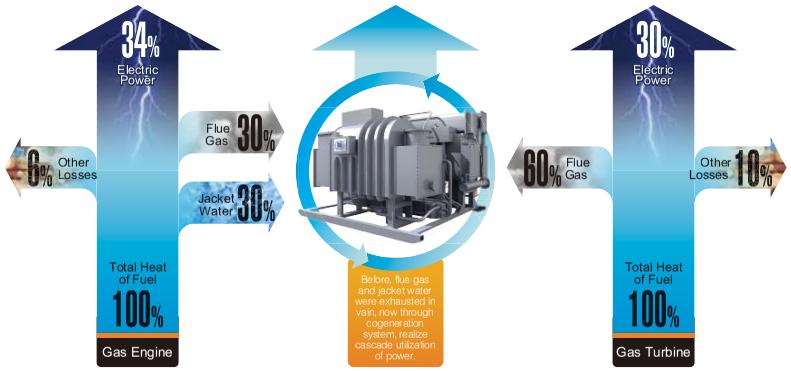
Shuangliang is capable of serving you with our 5 main types of chillers in this category as Flue Gas type, Flue Gas with Direct-fired after burning type, Flue Gas/ Steam type, Flue Gas/Hot Water type and Flue Gas/Hot Water with Direct-fired after burning type based on diversified applications.

Trigeneration System

Trigeneration (CCHP/BCHP), which applies the oil or gas as the prime energy resource to meet the requirements of community or buildings for the power, heating and/or cooling, can realize the cascade resources applications, such as the high grade energy is used for power generation, and less potential energy for heating and/or cooling to raise the utilization percentage of power to 85%, improve the safety of power supply by electric power network, save energy considerably, protect environment and continuous develop national economy. Application of trigeneration, which gives additional power supply to the society and reduces the energy consumption by air conditioning installations, has the active role to solve the power supply shortage. So, the trigeneration system is the only choice of development of power supply.

In the trigeneration system, the lithium bromide absorption chiller/heaters, operated by high temperature flue gas (or flue gas and waste hot water), can fully utilize the low potential heat energy, efficiently improve the integrated energy application percentage. Summing up, lithium bromide absorption chiller is the best heat recovery units in the trigeneration systems.

(The waste heat, which usually is discharged into atmosphere, now is utilized to drive the lithium bromide absorption chiller/heater(LBAC/H), realized the cascade application of prime energy resource.)



Trigeneration system can be widely used in places where electric power and air conditioning requirements exist simultaneously, such as factories, hospitals, large department stores, communities and industrial parks.

Flue Gas Type Lithium Bromide Absorption Chiller/Heater

Flue gas type lithium bromide absorption chiller/heaters are operated by the flue gas from generators and other heat sources, fall into two categories: flue gas type and flue gas/hot water type. High temperature flue gas type absorption chiller/heaters are mainly applicable to the trigeneration installations with turbo generators (including micro turbine) and other places where high temperature flue gas is available and air conditioning is necessary (such as industrial kilns). For flue gas-hot water fired types, main heat sources can find the flue gas and jacket water from internal combustion engine. These types can also be used in other places where high temperature flue gas is available and air conditioning is necessary.

In order to meet the requirements to comfort and technological needs of air conditioning system, lithium bromide absorption chiller/heaters with after-burning means can be installed, where heat from generator flue gas (or flue gas and hot water) is not enough to drive them.

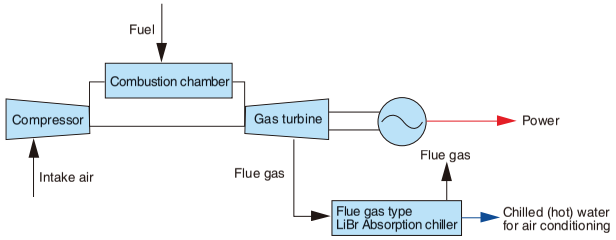
For trigenerator installation with internal combustion engine as drive, if flue gas is enough to meet the requirements of air conditioning, and hot water will be used for other applications, then flue gas type or such type with after-burning will be available.

Typical Modes for Application of Trigeneration System with Flue Gas type Lithium Bromide Absorption Chiller/Heater

◆Mode 1: Gas Turbine+Flue Gas Type Lithium Bromide Absorption Chiller

Working Principle

Fuel is burned in the gas turbine combustion chamber to produce high pressure and temperature gas to drive gas turbine generator, flue gas of which is directed to lithium bromide absorption chiller/heaters to produce chilled (hot) water for air conditioning.



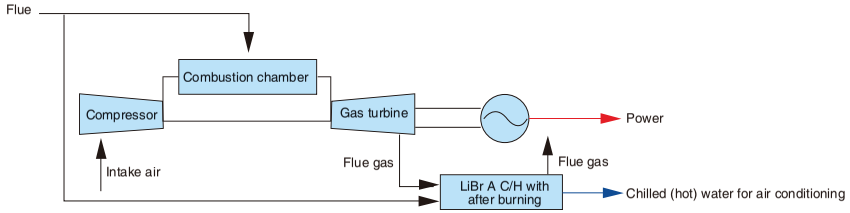
Application Features

- Gas turbine generator is working based on simple circle, which is beneficial to improve rate of utilizing waste heat.
- Flue gas from gas turbine is used in flue gas type lithium bromide absorption chiller/heater, to simplify the installation configuration, save equipment investment, and improve the energy integrated utilization in system.
- This mode is applicable to the trigeneration system with gas turbine generator.

◆Mode 2: Gas Turbine+Flue gas type Lithium Bromide Chiller/Heater with after burning

Working Principle

Fuel is burned in the gas turbine combustion chamber to produce high pressure and temperature gas to drive gas turbine generator, flue gas of which is directed to lithium bromide absorption chiller/heaters with after burning to offer chilled (hot) water for air conditioning. When the flue gas can not meet the cooling capacity required by air-conditioning, the after burning system is started to supply additional portion of fuel into the combustion chamber of absorption chiller/heater.



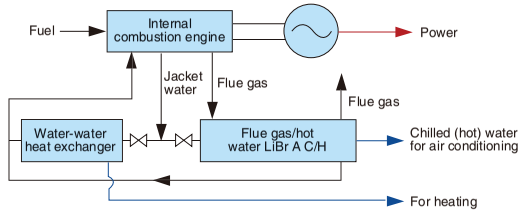
Application Features

- Gas turbine generator is working based on simple circle, which is beneficial to improve rate of utilizing waste heat.
- Flue gas from gas turbine is used in flue gas type lithium bromide absorption chiller/heater with after burning, to simplify the installation configuration, save equipment investment, and improve the energy integrated utilization in system.
- Installation of flue gas type lithium bromide absorption chiller with after burning allows rational configuration of generator and chiller/heater capacity based on the air conditioning system cooling and heating load, safe equipment investment, and improve the energy integrated utilization in system.
- This mode is applicable to the trigeneration system with gas turbine generator

◆Mode 3: Internal Combustion Engine +Flue Gas/Hot Water Type Lithium Bromide Absorption Chiller/Heater

Working Principle

Fuel is burned in the engine combustion chamber to produce mechanical power for driving generator. Engine high temperature flue gas and jacket hot water is directed to lithium bromide absorption chiller/heaters to offer chilled (hot) water for air conditioning. Engine circulating jacket water is directed to water-water heater exchanger to supply heating when the system is running.



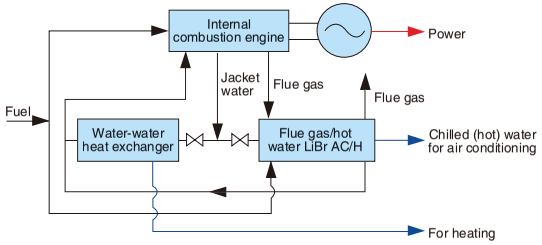
Application Features

- Internal combustion engine flue gas and jacket water can be used directly to operate flue gas/hot water type absorption chiller to simplify equipment configuration, reduce equipment investment and improve the system integrated energy utilization.
- This mode is applicable to the trigeneration system with internal combustion engine driven generators

◆ Mode 4: Internal Combustion engine + Flue gas / hot water operated Absorption chiller / Heater with after burning

Working Principle

Fuel is burned in the engine combustion chamber to produce mechanical power for driving generator. Engine high temperature flue gas and jacket hot water is directed to lithium bromide absorption chiller/heaters with after burning to offer chilled (hot) water for air conditioning.
Engine circulating jacket water is directed to water-water heater exchanger to supply heating when the system is running.



Application Features

- Internal combustion engine flue gas and jacket water can be used directly to operate flue gas/hot water type absorption chiller with after burning to simplify equipment configuration, reduce equipment investment and improve the system integrated energy utilization.
- Installation of flue gas and hot water operated lithium bromide absorption chiller with after burning allows rational configuration of generator and chiller/heater capacity based on the air conditioning system cooling and heating load, save equipment investment and improve the system operation economy.
- This mode is applicable to the trigeneration system with internal combustion engine driven generators.

Description of Different Types of Flue Gas Type Lithium Bromide Absorption Chiller / Heaters and Their Applications

Type	Flue Gas Type	Flue Gas type with After Burning	Flue Gas/Hot Water type	Flue Gas/Hot water Type with After Burning
Function	Cooling/heating	Cooling/heating	Cooling, heating	Cooling/heating
Cooling capacity	99~1000USRt	99~1000USRt	99~2646USRt	99~2646USRt
Heat source	High temperature flue gas	High temperature flue gas, gas (oil)	High temperature flue gas, hot water	High temperature flue gas, hot water, gas (oil)
Heat source characteristics	Flue gas temp.≥250℃	Flue gas temp.≥250℃ Natural gas, LPG, city gas, light and heavy fuel oil	Flue gas temp.≥250℃ Hot water temp.≥90℃	Flue gas temp.≥250℃ Hot water temp.≥90℃ Natural gas, LPG, city gas, light and heavy fuel oil
Applications	Places, where high temp. flue gas (with low content of sulphur and foreign matter) is available and air conditioning is necessary.	Places, where high temp. flue gas (with low content of sulphur and foreign matter) is available and air conditioning is necessary.	Places, where high temp. flue gas (with low content of sulphur and foreign matter) and hot water is available and air conditioning is necessary.	Places, where high temp. flue gas (with low content of sulphur and foreign matter) is available.
Application Features	Applied mainly for trigeneration system with gas turbine (including micro turbine), internal combustion engine, fuel cell as generator drive, also can be used for cooling (heating) by high temperature flue gas (such as flue gas of industrial kilns)	Applied mainly for trigeneration system with gas turbine (including micro turbine), internal combustion engine, fuel cell as generator drive, also can be used for cooling (heating) by high temperature flue gas (such as flue gas of industrial kilns)	Applied mainly for trigeneration system with internal combustion engine as generator drive, also can be used for cooling (heating) by high temperature flue gas (such as flue gas of industrial kilns) and waste hot water	Applied for gas turbine generator plant, micro-turbo generators, and internalan external combustion engine generators

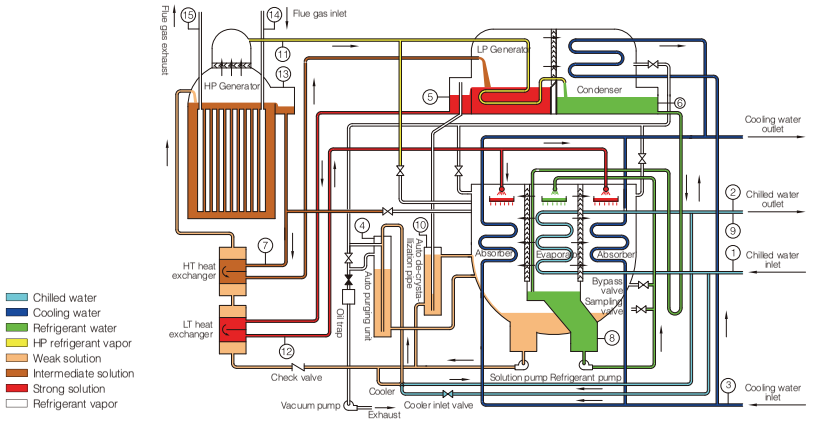
Flue gas type absorption chiller/heater

Max. design capacity: 3300USRt. Inlet temp. of flue gas ≥250℃, flue gas is required to be clean and corrosion-free while having qualified back pressure for it's clearance (induct fan shall be introduced into the system if such back pressure is not sufficient). Our standardized series of chillers have 430~520℃ and 170℃ for flue gas inlet/outlet temp. respectively, chilled water inlet/outlet temp. 12/7℃, hot water inlet/outlet temp. 56/60℃, cooling water inlet/outlet temp. 32/38℃. Please consult with our technical dept. for details and other applications.

Working Principle

◆ Cooling cycle and its Features

Flue gas type lithium bromide absorption chiller/heater is a equipment, which uses high temperature flue gas discharged by gas turbine installation, as fuel, water as refrigerant, lithium bromide as absorbent solution, produces chilled and/or hot water for the purpose of air-conditioning and technology process. It consists of flue gas high pressure generator (HP generator), low pressure generator (LP generator), condenser, evaporator, absorber, high temperature heat exchanger (HT heat exchanger), low temperature heat exchanger (LT heat exchanger); and such auxiliary parts, as hermetically-sealed pumps and vacuum pump, and keeps itself under vacuum conditions by vacuum pump and automatic purge unit



① Chilled water inlet temp. (I)
② Chilled water outlet temp. (C,I,A)
③ Cooling water inlet temp. (C,I,A)
④ Auto purging unit pressure (I)
⑤ LP generator strong solution temp. (C,I)
⑥ Condensation temp. (C,I,A)
⑦ HP generator intermediate solution temp. (I,A)
⑧ Evaporation temp. (I,A)
⑨ Chilled water flow (A)
⑩ De-crystallization pipe temp. (I,A)
⑪ HP generator pressure (C,I,A)
⑫ Strong solution spraying temp. (C,I)
⑬ HP solution level(C,I))
⑭ Flue gas inlet temp. (I)
⑮ Flue gas exhausted temp. (I)

(A)—Alarm
(I)—Indication
(C)—Control

Evaporator Chilled water from customer (about 12℃) enters heat transfer tubes, and evaporates refrigerant water, which is dripped over the tubes. Thus produced chilled water runs from the evaporator at temperature about 7℃ into the external system. Refrigerant water absorbs heat from external system, becomes water vapor, and flows into absorber.

Absorber Strong lithium bromide solution possesses tremendous water vapor absorbing capacity drips over tubes, absorbs refrigerant vapor, produced in the evaporator, and becomes weak solution. Cooling water from cooling tower enters the heat transfer tubes to cool the strong solution distributed outside tubes, and carries away heat (i.e. heat from external system). After absorbing water vapor, solution is diluted and sent to HP generator through heat exchangers.

Flue Gas High Pressure generator (HP generator) The flue gas is used to heat and boil the lithium bromide weak solution in the HP generator. The weak solution is concentrated into intermediate solution, which flows into the low pressure generator through HT heat exchanger, and produces high temperature refrigerant vapor, which enters LP generator also.

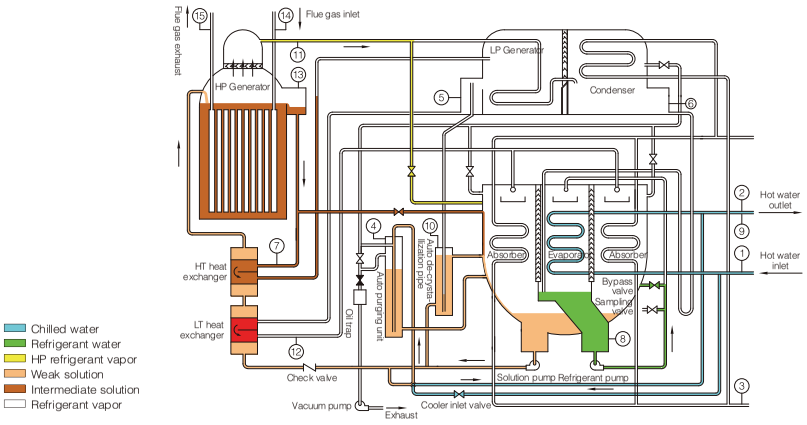
Low Pressure generator (LP generator) Lithium bromide intermediate solution, which flows from the HP generator via LT heat exchanger and temperature is reduced, is heated by refrigerant vapor, produced in the HP generator, and concentrated to strong solution, which flows into the absorber through LT heat exchanger, produced vapor flows into condenser. Refrigerant vapor, which flows from HP generator, is condensed by heating the solution, and enters condenser also.

Condenser: Cooling water flows through tubes in the condenser and condenses the vapor outside the tubes into refrigerant water. The produced refrigerant water enters the evaporator through U pipe as refrigerant element for refrigeration.

Low temperature heat exchanger (LT Heat Exchanger) Strong solution from LP generator exchanges heat with weak solution from absorber for raising the temperature of weak solution and recovering heat from strong solution.

High temperature heat exchanger (HT Heat Exchanger) Intermediate solution from HP generator exchanges heat with weak solution from LT heat exchanger for raising the temperature of weak solution further. Heat exchangers reduced the heat requirements of HP generator, in the mean time, reduced the cooling water requirements. Performance of heat exchangers determines the operation conditions of chiller/heaters.

◆Heating cycle



① Hot water inlet tem. (I)
② Hot water outlet temp. (C,I,A)
④ Auto purging unit pressure (I)
⑦ HP generator intermediate solution temp. (I,A)
⑨ Hot water flow (A)
⑪ HP generator pressure (C,I,A)
⑬ HP solution level (C,I))
⑭ Flue gas inlet temp. (I)
⑮ Flue gas exhausted temp. (I)

(A)—Alarm
(I)—Indication
(C)—Control

Technical Parameters

◆Flue Gas Type Absorption Chiller/Heaters Technical Parameters

Type		YX480-	35H2	47H2	58H2	70H2	81H2	93H2	105H2	116H2	145H2	174H2
Cooling Capacity		kW	350	470	580	700	810	930	1050	1160	1450	1740
		10^4kcal/h	30	40	50	60	70	80	90	100	125	150
		USRt	99	132	165	198	231	265	298	331	413	496
Heating Capacity		10^4kcal/h	24	32	40	48	56	64	72	80	100	120
Chilled/Hot Water	Chilled Water In/Out Temp	℃	12→7									
	Hot Water In/Out Temp	℃	56→60									
	Flow	m^3/h	60	80	100	120	140	160	180	200	250	300
	Pressure Loss	mH_2O	4.5	4.5	5	6	5.5	6.5	9	9	4	4
	Connection Diameter (DN)	mm	100	100	125	125	150	150	150	150	200	200
Cooling Water	In/Out Temp	℃	32→38									
	Flow	m^3/h	86	114	143	172	200	229	257	286	357	429
	Pressure Loss	mH_2O	7	6.5	6.5	7	8	9	5.5	5.5	7.0	7.0
	Connection Diameter (DN)	mm	100	125	150	150	150	150	200	200	200	250
Flue Gas	Flow	kg/h	2745	3655	4570	5485	6400	7310	8225	9140	11425	13710
	Pressure Loss	mmH_2O	70	110	90	120	130	140	160	160	150	160
	Inlet Diameter (Φ)	mm	250	300	350	350	400	400	450	450	500	600
	Outlet Diameter (Φ)	mm	250	300	350	350	400	400	450	450	500	600
Electric Power	Power Supply		3Φ - 380V - 50Hz									
	Total Current	A	12.6	13.7	13.7	16.8	16.8	16.8	17.4	19.2	19.8	19.8
	Electric Power	kW	3.8	4.2	4.2	5	5	5	5.2	5.5	5.9	5.9
Overall Dimensions	Length	mm	3800	3820	3808	3820	3840	3840	4340	4340	4810	4885
	Width		2296	2406	2606	2716	2861	2871	2911	3021	3338	3615
	Height		2332	2351	2349	2411	2496	2544	2564	2807	2897	3034
Shipping Weight		t	7.2	8.3	9.8	10.5	11.4	12.5	13.8	14.2	17.1	19.6
Operation Weight			8.2	9.6	11.6	12.7	14.2	15.6	17.5	18.4	23	26.4

Note

(1) Values for chilled water,hot water,cooling water in the above table are for nominal operation conditions,and can be properly adjusted in actual operation.
(2) The lowest outlet temp.for chilled water is 5℃. Inlet temp of cooling water can be adjusted in the range of 18~34℃
(3) Flow of chilled/hot water can be adjusted in the range of 60~120%.
(4) Fouling factor on chilled/hot/cooling water side is 0.086m^2K/kw(0.0001m^2·h·℃/kcal).
(5) Cooling capacity can be adjusted in the range of 20~100%.
(6) Flue gas temperature for models mentioned in the sheet is 480℃.

Type		YX480-	204H2	233H2	262H2	291H2	349H2	407H2	465H2	523H2	582H2
Cooling Capacity		kW	2040	2330	2620	2910	3490	4070	4650	5230	5820
		10^4kcal/h	175	200	225	250	300	350	400	450	500
		USRt	579	661	744	827	992	1157	1323	1488	1653
Heating Capacity		10^4kcal/h	140	160	180	200	240	280	320	360	400
Chilled/Hot Water	Chilled Water In/Out Temp	℃	12→7								
	Hot Water In/Out Temp	℃	56→60								
	Flow	m^3/h	350	400	450	500	600	700	800	900	1000
	Pressure Loss	mH_2O	4	5	6.5	6.5	8.5	8	9	12.5	12
	Connection Diameter (DN)	mm	200	250	250	250	300	300	350	350	350
Cooling Water	In/Out Temp	℃	32→38								
	Flow	m^3/h	500	572	643	715	857	1000	1143	1286	1429
	Pressure Loss	mH_2O	7	9	10	9.0	11.5	11	5.5	6.5	7
	Connection Diameter (DN)	mm	250	250	250	300	350	350	400	400	400
Flue Gas	Flow	kg/h	15990	18280	20560	22850	27410	31980	36550	41120	45690
	Pressure Loss	mmH_2O	160	160	180	160	170	170	160	155	160
	Inlet Diameter (Φ)	mm	600	700	700	700	800	900	900	1000	1000
	Outlet Diameter (Φ)	mm	600	700	700	700	800	900	900	1000	1000
Electric Power	Power Supply		3Φ - 380V - 50Hz								
	Total Current	A	19.8	21.7	26	26.9	31.8	33.5	36.5	36.5	42.3
	Electric Power	kW	5.9	6.9	7.9	7.9	9.6	10.1	11.1	11.1	12.6
Overall Dimensions	Length	mm	4885	5308	5733	5958	7230	7230	7230	7930	7960
	Width		3825	3785	3925	4010	4437	4712	5022	5132	5559
	Height		3150	3280	3320	3470	3760	4060	4240	4420	4570
Shipping Weight		t	22.1	24.7	25.9	31.1	38.1	44.3	48.7	52.7	60.5
Operation Weight			29.4	33.7	36	42	52.3	60.1	66.3	72	82.4

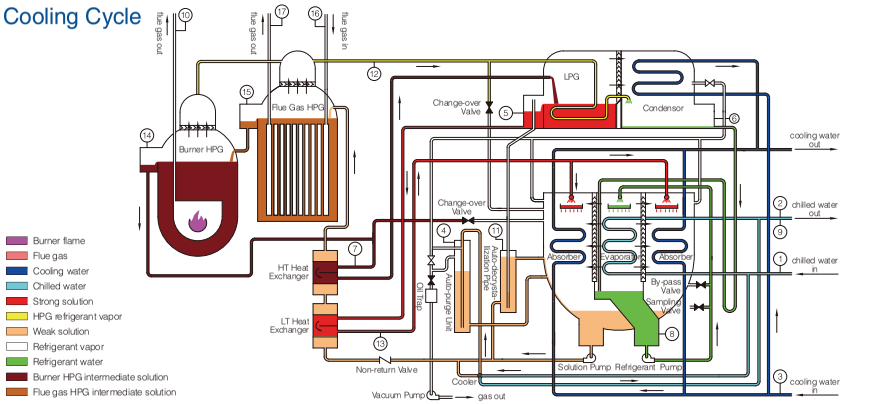
Note

(1) Values for chilled water,hot water,cooling water in the above table are for nominal operation conditions,and can be properly adjusted in actual operation.
(2) The lowest outlet temp.for chilled water is 5℃. Inlet temp of cooling water can be adjusted in the range of 18~34℃
(3) Flow of chilled/hot water can be adjusted in the range of 60~120%.
(4) Fouling factor on chilled/hot/cooling water side is 0.086m^2K/kw(0.0001m^2·h·℃/kcal).
(5) Cooling capacity can be adjusted in the range of 20~100%.

Flue Gas with Direct-fired After Burning Type Lithium Bromide Absorption Chiller/Heater

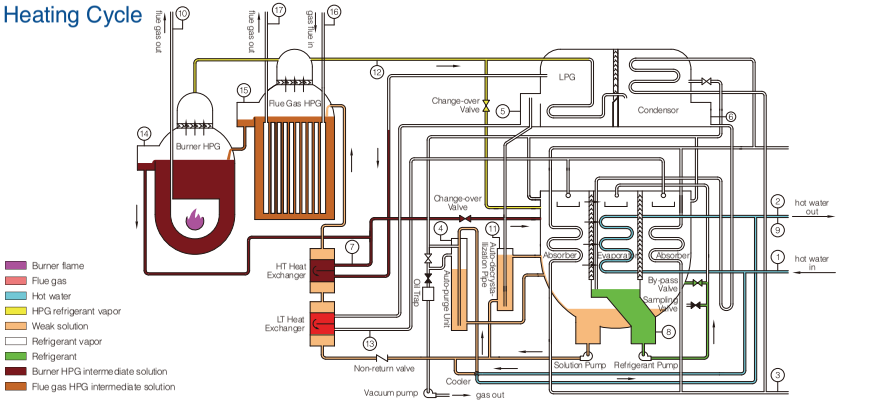
Inlet temp. of flue gas ≥250℃, flue gas is required to be clean and corrosion-free while having qualified back pressure for it's clearance (induct fan shall be introduced into the system if such back pressure is not sufficient). After burning fuel can be oil (light diesel oil) or gas (NG, city gas etc). Our standardized series of chillers have 430~520℃ and 170℃ for flue gas inlet/outlet temp. respectively, after burning capacity can compensate up to 100% of nominal load capacity by using split structure, chilled water inlet/outlet temp. 12℃/7℃, hot water inlet/outlet temp. 56℃/60℃, cooling water inlet/outlet temp. 32℃/38℃. Cooling capacity: 350-5820 kw.
Please consult with our technical dept. for details and other applications.

Cooling Cycle



① Chilled water inlet temp. (I)
② Chilled water outlet temp. (C,I,A)
③ Cooling water inlet temp. (C,I,A)
④ Auto-purge unit pressure (I)
⑤ LPG strong solution temp. (C,I)
⑥ Condensation temp. (C,I,A)
⑦ HPG intermediate solution temp. (I,A)
⑧ Evaporation temp.erature (I,A)
⑨ Chilled water flow (A)
⑩ Burner flue temp. (I,A)
⑪ Auto-decrystallization pipe temp. (I,A)
⑫ HPG pressure (C,I,A)
⑬ Strong solution spray temp. (C,I)
⑭ Burner HPG solution level (C,I)
⑮ Flue gas solution level (C,I)
⑯ Flue gas inlet temp. (I)
⑰ Gas flue out temp. (I)
(I)–Display
(C)–Control
(A)–Alarm

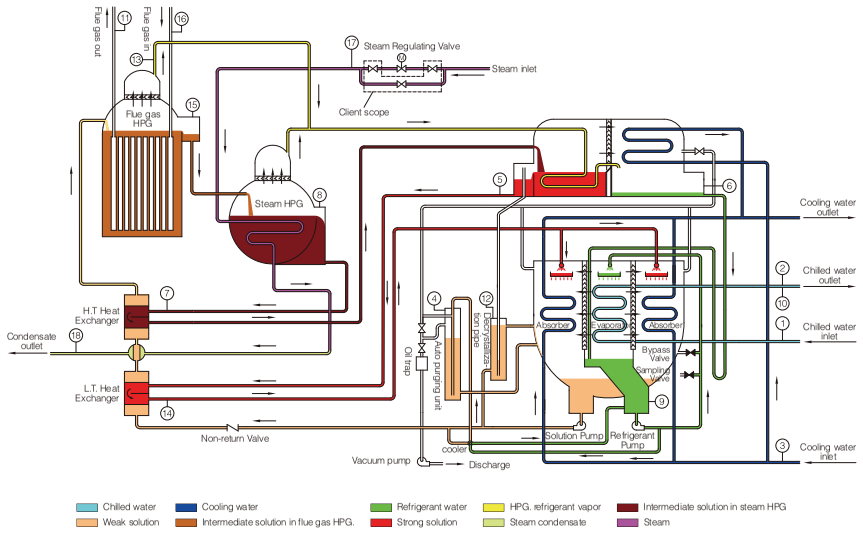
Heating Cycle



① Hot water inlet temp. (I)
② Hot water outlet temp. (C,I,A)
④ Auto-purge unit pressure (I)
⑦ HPG intermediate solution temp. (I,A)
⑨ Hot water flow rate (A)
⑩ Burner flue gas temp. (I,A)
⑫ HPG pressure (C,I,A)
⑭ Burner HPG solution level (C,I)
⑮ Flue gas burner HPG solution level (C,I)
⑯ Flue gas inlet temp. (I)
⑰ Gas flue outlet temp. (I)
(I)–Display
(C)–Control
(A)–Alarm

Flue Gas/Steam Type
Lithium Bromide Absorption Chiller

Inlet temp. of flue gas≥250℃, flue gas is required to be clean and corrosion-free while having qualified back pressure for it's clearance (induct fan shall be introduced into the system if such back pressure is not sufficient). Our standard-ized series of chillers have 170℃ for flue gas outlet temp., steam pressure 0.4~0.8MPa, chilled water inlet/outlet temp. 12℃/7℃, cooling water inlet/outlet temp. 32℃/38℃. Cooling Capacity for single unit: 350~5820kw.
Please consult with our technical dept. for details and other applications.



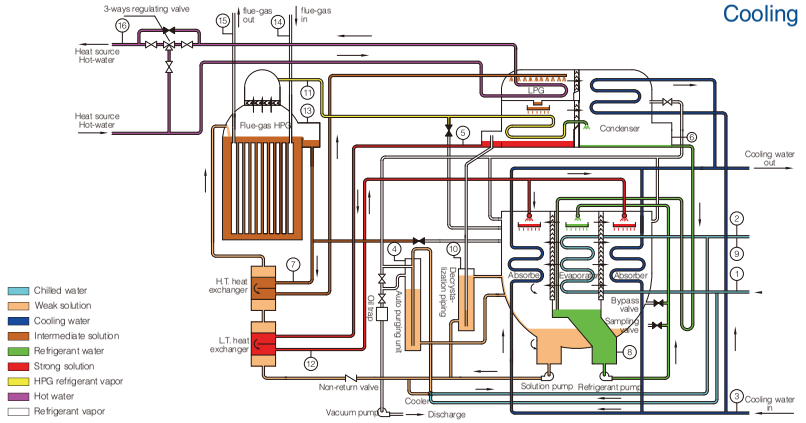
① Chilled water inlet temp. (I)
② Chilled water outlet temp. (C,I,A)
③ Cooling water inlet temp. (C,I,A)
④ Purging unit pressure (I)
⑤ Strong solution temp.in LPG (C,I)
⑥ Condensation Temp. (I,A)
⑦ Intermediate solution temp.(I,A)
⑧ Solution level in steam HPG (C,I)
⑨ Evaporation temp. (I,A)
⑩ Chilled water flow (A)
⑪ Flue gas outlet temp. (I)
⑫ Decrystallization pipe temp. (I,A)
⑬ Pressure in HPG (C,I,A)
⑭ Strong solution spraying temp (C,I)
⑮ Solution level in flue gas HPG (C,I)
⑯ Flue gas inlet temp. (I)
⑰ Steam pressure (C,I,A)
⑱ Steam condensate temp. (I)

(C)—Control
(A)—Alarm
(I)—Indication

Flue Gas/Hot Water Type
Lithium Bromide Absorption Chiller/Heater

Inlet temp. of flue gas ≥250℃, flue gas is required to be clean and corrosion-free while having qualified back pressure for it's clearance (induct fan shall be introduced into the system if such back pressure is not sufficient). Hot water re-turning temp. ≥92℃ (hot water inlet temp. ≥98℃), chilled water outlet temp. ≥7℃, cooling water inlet/outlet temp. 28℃/34℃. Cooling capacity for single unit: 350-3490 kw.
Please consult with our technical dept. for details and other applications.

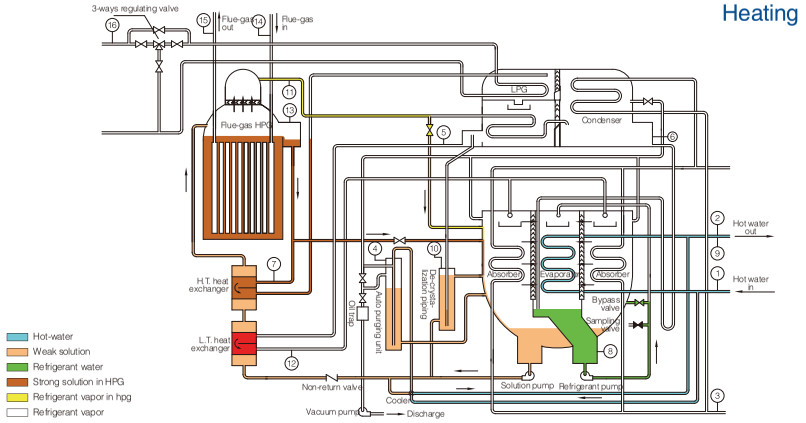
Cooling Cycle



① Chilled water inlet temp. (I)
② Chilled water out temp. (C,I,A)
③ Cooling water inlet temp.(C,I,A)
④ Puring unit pressure(I)
⑤ Strong solution temp. in LPG (C,I)
⑥ Condensation temp. (C,I,A)
⑦ Intermediate solution temp in HPG (I,A)
⑧ Evaporation temp. (I,A)
⑨ Chilled water flow (A)
⑩ Decrystallizaion piping temp. (I,A)
⑪ Pressure in HPG (C,I,A)
⑫ Strong solution spraying temp. (C,I)
⑬ Solution level in HPG (C,I)
⑭ Flue-gas inlet temp. (I)
⑮ Flue-gas outlet temp. (I)
⑯ Heat source hot-water outlet temp. (C,I)

(A)–Alarm
(I)-Display
(C)–Control

Heating Cycle

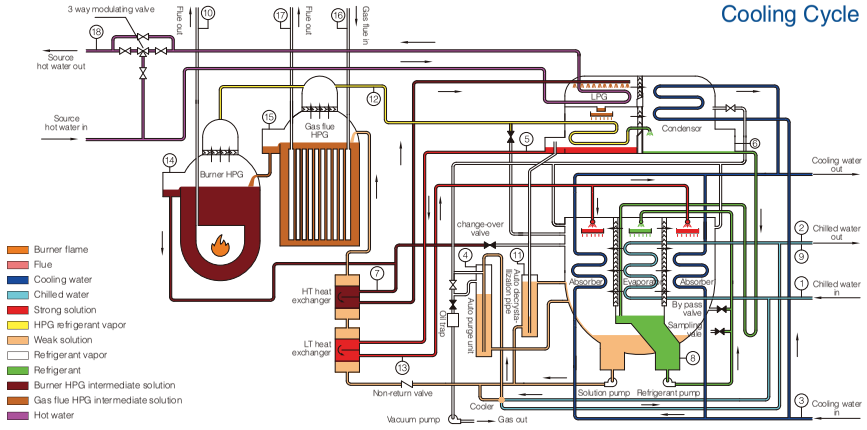


① Hot water inlet temp. (I)
② Hot water out temp. (C,I,A)
④ Puring unit pressure(I)
⑦ Strong solution temp. in HPG (I,A)
⑨ Hot water flow rate (A)
⑪ Pressure in HPG (C,I,A)
⑬ Solution level in HPG (C,I)
⑭ Flue-gas inlet temp. (I)
⑮ Flue-gas outlet temp. (I)
(A)–Alarm
(I)-Display
(C)-Control

Flue Gas/Hot Water with Direct-fired After Burning Type Lithium Bromide Absorption Chiller/Heater

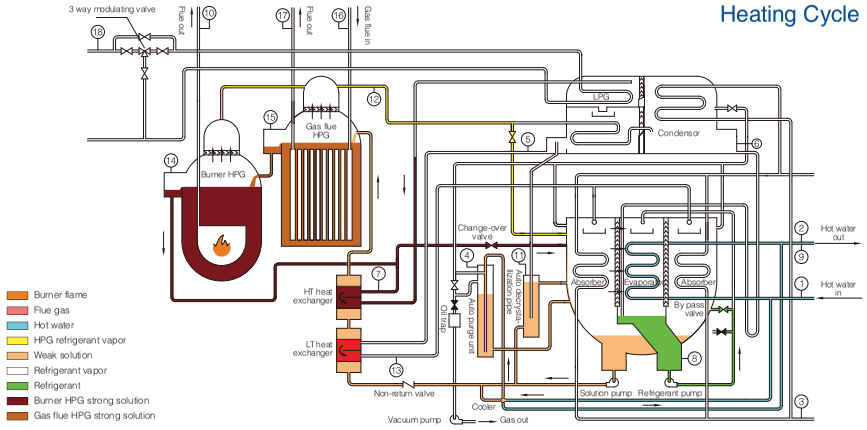
Inlet temp. of flue gas ≥250℃, flue gas is required to be clean and corrosion-free while having qualified back pressure for it's clearance (induct fan shall be introduced into the system if such back pressure is not sufficient). After burning fuel can be oil (light diesel oil) or gas (NG, city gas etc). Hot water returning temp. ≥92℃ (hot water inlet temp. ≥98℃), chilled water outlet temp. ≥7℃, cooling water inlet/outlet temp. 28℃/34℃. Cooling capacity for single unit: 350-3490 kw. Please consult with our technical dept. for details and other applications.

Cooling Cycle



① Chilled water inlet temp. (I)
② Chilled water outlet temp. (C,I,A)
③ Cooling water inlet temp. (C,I,A)
④ Purge unit pressure (I)
⑤ LPG strong solution temp. (C,I)
⑥ Condensation temp. (C,I,A)
⑦ HPG intermediate solution temp. (I,A)
⑧ Evaporation (I,A)
⑨ Chilled water flow rate (A)
⑩ Burner flue out temp. (I,A)
⑪ Decrystallization pipe temp. (I,A)
⑫ HPG pressure (C,I,A)
⑬ Strong solution spray temp. (C,I)
⑭ Burner HPG solution level (C,I)
⑮ Gas flue burner solution level (C,I)
⑯ Gas flue inlet temp. (I)
⑰ Gas flue out temp. (I)
⑱ Source hot water out temp. (C,I)
(I)–Display
(C)–Control
(A)–Alarm

Heating Cycle



① Hot water inlet temp. (I)
② Hot water outlet temp. (C,I,A)
④ Purge unit pressure (I)
⑦ HPG intermediate solution temp. (I,A)
⑨ Hot water flow (A)
⑩ Burner flue out temp. (I,A)
⑫ HPG pressure (C,I,A)
⑭ Burner HPG solution level (C,I)
⑮ Gas flue HPG solution level (C,I)
⑯ Gas flue inlet temp. (I)
⑰ Gas flue out temp. (I)
(I)–Display
(C)–Control
(A)–Alarm

2 H2 Type Direct Fired Lithium Bromide Absorption Chiller/Heater

H2-type direct fired lithium bromide absorption chiller/heater is a kind of large-size industrial facility to supply cool or heat with gas (natural gas, city gas, or LPG) or oil (diesel oil) as the driving energy and lithium bromide solution as the absorbent and water as refrigerant.

H2-type direct fired chiller/heater, using fuel as the energy source (with only limited electricity as auxiliary power), not only reduces greatly the cost for electricity and operates in regions where there are cheap natural gas resources, but also compensates the peak-valley load difference. When the hot summer rolls in, shortage of electric power will poses a great worry for various cities. Concentrated consumption of power by air-conditioners is the sticking point for such a seasonal problem, for which, H2-type direct fired chiller/heater offer an attractive solution.

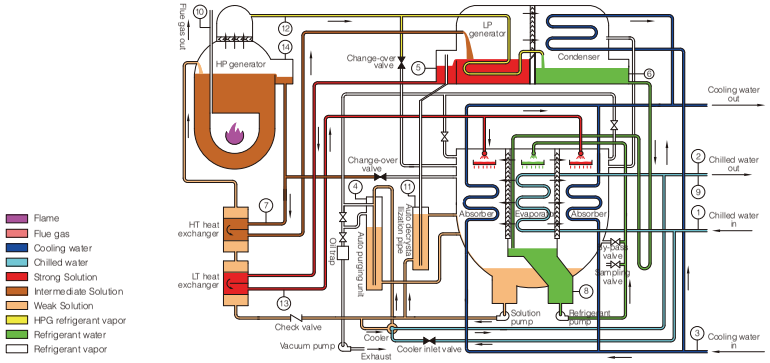
The most attractive feature of Shuangliang H2-type direct fired chiller/heater is its stunning performance in energy saving. High COP of 1.325 and provenly high efficiency rank Shuangliang H2-type direct fired chiller/heater in the leading position worldwide.

Shuangliang H2-type direct fired chiller/heater are widely applied in industries, such as precision machinery manufacturing, instruments & meters, aviation & aerospace, textiles, electronics, electric power, metallurgy, pharmaceuticals, cigarettes, chemicals, hospitals, food, etc. By utilizing dozens of patented technologies with features of extremely high energy efficiency and outstanding environmental effects, in addition to her customer service experience of over 25 years, Shuangliang guarantees to reward her users with optimal returns.

Performance Parameters Working Principle

This direct-fired absorption chiller/heater is operated by heat from fuel and gas burner and with LiBr solution as the absorbent. It consists of high pressure generator, low pressure generator, condenser, evaporator, absorber, high and low temperature heat exchangers, and canned motor and vacuum pumps, is a combination of shell and tube heat exchangers. It is operated under vacuum conditions by vacuum pump and auto-purging unit.

Cooling Cycle



① Chilled water inlet temp. (I)
② Chilled water outlet temp. (C,I,A)
③ Cooling water inlet temp. (C,I,A)
④ Auto-purging unit pressure (I)
⑤ LPG strong solution temp. (C,I)
⑥ Condensation temp. (C,I,A)
⑦ HPG intermediate solution temp. (I,A)
⑧ Evaporation temp. (I,A)
⑨ Chilled water flow (A)
⑩ Flue gas exit temp. (I,A)
⑪ De-crystallization pipe temp. (I,A)
⑫ HPG pressure (C,I,A)
⑬ HPG pressure (C,I,A)
⑭ HPG solution level (C,I)

(I)--Indication
(C)--Control
(A)--Alarm

Special Features of Cooling Cycle

Evaporator Water to be chilled of 12℃ is supplied into the tubes of evaporator, and cooled to 7℃ by the sprayed refrigerant, and returns to the external system. Refrigerant gains the heat from the external system, and becomes vapor, which enters the absorber.

Absorber LiBr solution, as an absorbent, possesses strong absorbing capacity to water vapor and is sprayed on the heat-exchanging tubes of the absorber to absorb the vapor generated in the evaporator and is then diluted. Heat of solution (i.e. heat from the external system) is carried away by the cooling water from the cooling tower through heat exchange tubes in the absorber, and diluted solution collects under the bottom of the absorber, after being purged by solution pump and heated in the heat exchanger, it enters the HPG.

High Pressure Generator (hereinafter HPG) Large quantity of vapor is generated by heating the solution with high-temperature flame and meanwhile the solution is concentrated into intermediate solution, which enters with vapor the low pressure generator after being cooled down though high-temperature heat exchanger.

Low Pressure Generator (hereinafter LPG) The intermediate solution, which is cooled down and enters the LPG, is once again heated by vapor from HPG and vapor generated. The solution is further concentrated. The strong solution flows back to the absorber after being cooled down through heat-exchanging in the low-temperature heat exchanger. The vapor thus generated enters the condenser. The vapor from HPG is condensed to water after heating the solution and enters the condenser after being regulated.

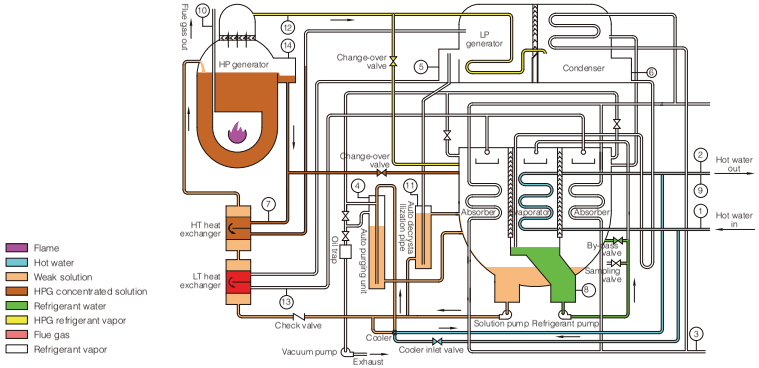
Condenser Cooling water flows through tubes in the condenser and condenses the vapor outside the tubes into refrigerant water. The produced refrigerant water enters the evaporator through U pipe as refrigerant element for refrigeration.

LT Heat Exchanger Low temperature heat exchanger is used to exchange heat between the solution from LPG and weak solution from absorber to increase the temperature of weak solution and thus to recover the heat of strong solution.

HT Heat Exchanger High temperature heat exchanger is used to exchange heat between the intermediate solution from HPG and the weak solution after being heated in the low temperature heat exchanger, to further increase the temperature of weak solution.

Heat exchangers are used to decrease the heat consumption in the HPG and reduce the cooling water load required for lowering the temperature of strong solution, which is vital to the energy-saving efficiency of the unit.

Heating Cycle



① Hot water inlet temp. (I)
② Hot water outlet temp. (C,I,A)
③ Cooling water inlet temp. (C,I,A)
④ Auto-purging unit pressure (I)
⑤ LPG strong solution temp. (C,I)
⑥ Condensation temp. (C,I,A)
⑦ HPG intermediate solution temp. (I,A)
⑧ Evaporation temp. (I,A)
⑨ Hot water flow (A)
⑩ Flue gas exit temp. (I,A)
⑪ De-crystallization pipe temp. (I,A)
⑫ HPG pressure (C,I,A)
⑬ Strong soltuion spray temp. (C,I)
⑭ HPG solution level (C,I)

(I)--Indication
(C)--Control
(A)--Alarm

Special Features of Heating Cycle

In HP generator solution is heated to produce vapor, which is led to the evaporator to heat the hot water in the tubes. Strong solution mixes with refrigerant water to form weak solution. Then solution is pumped to HP generator to repeat the circulation and heating.
During changing chiller/heater from cooling mode to heating mode, two changeover valves (see flow chart) should be opened simultaneously, and cooling water pump and refrigerant pump should be shut down.

Table of Technical Parameters (SI)

Model				DF-	99H2	132H2	165H2	198H2	231H2	265H2	298H2	331H2	413H2
Cooling Capacity				kW	350	470	580	700	810	930	1050	1160	1450
				10^4kcal/h	30	40	50	60	70	80	90	100	125
				USRt	99	132	165	198	231	265	298	331	413
Heating Capacity				10^4kcal/h	24	32	40	48	56	64	72	80	100
Chilled/ Hot Water	Inlet/Outlet Temp.(Chilled Water)			℃	12 → 7								
	Inlet/Outlet Temp.(Heated Water)			℃	56 → 60 (50 → 60)								
	Flow Rate			m^3/h	60(24)	80(32)	100(40)	120(48)	140(56)	160(64)	180(72)	200(80)	250(100)
	Pressure Loss			mH_2O	4.4(0.7)	4.5(0.72)	4.7(0.76)	5.7(0.92)	5.6(0.9)	6.2(1.0)	8.8(1.41)	8.8(1.41)	3.8(0.61)
	Connection Diameter(DN)			mm	100	100	125	125	150	150	150	150	200
Cooling Water	Inlet/Outlet Temp.			℃	32 → 38								
	Flow Rate			m^3/h	85	113	141	170	198	226	255	283	353
	Pressure Loss			mH_2O	6.5	6.2	6.4	6.9	7.5	7.7	5.3	5.3	7.1
	Connection Diameter(DN)			mm	100	125	150	150	150	150	200	200	200
Fuel	Light Oil (10400kcal/kg)	Consumption	Cooling	kg/h	21.3	28.5	35.6	42.7	49.8	56.9	64	71.1	88.9
			Heating		24.6	32.8	41	49.2	57.4	65.6	73.8	82	102.5
		Connection Diameter(G)		in	3/8"								
	Heavy Oil (10000kcal/kg)	Consumption	Cooling	kg/h	22.2	29.6	37	44.4	51.8	59.2	66.6	74	92.5
			Heating		25.6	34.1	42.7	51.2	59.7	68.2	76.8	85.3	106.6
		Connection Diameter(G)		in	2"								
	City Gas (3500kcal/Nm^3 Density=0.62)	Consumption	Cooling	Nm^3/h	63.4	84.5	105.6	126.8	147.9	169.0	190.2	211.3	264.1
			Heating		73.1	97.5	121.8	146.2	170.6	194.9	219.3	243.7	304.6
		Inlet Pressure		mmH_2O	200~3000	400~3000					500~3000		
		Connection Diameter(G)		mm(in)	2"				65				80
	Natural Gas (11000kcal/Nm^3 Density=0.64)	Consumption	Cooling	Nm^3/h	20.2	26.9	33.6	40.3	47.1	53.8	60.5	67.2	84
			Heating		23.3	31	38.8	46.5	54.3	62	69.8	77.5	96.9
		Inlet Pressure		mmH_2O	150~2500	250~2500				350~2500		400~3000	
		Connection Diameter(G)		mm(in)	1 1/2"				2"				65
Air Flow for Combustion(30℃)			Cooling	m^3/h	324	432	540	648	755	865	970	1080	1350
			Heating		372	496	620	744	868	992	1120	1240	1550
Exhaust Connection Dimension				mm	170×250	170×250	200×300	200×300	250×360	250×360	250×360	250×450	250×500
Electrical Data	Power Supply				3Φ - 380VAC - 50Hz								
	Total Current	Light Oil		A	14.7	15.4	15.4	19.6	19.6	20.2	20.8	22.6	24.9
		Heavy Oil			16.9	18.9	18.9	27.6	27.6	27.6	28.6	46.5	46.5
		Gas			14.7	15.4	15.4	19.6	19.6	20.2	20.8	22.6	24.9
	Electric Power	Light Oil		kW	4.4	5	4.95	6.4	6.4	6.8	7	7.3	8.5
		Heavy Oil			8.58	9.1	9.1	10.76	10.76	10.76	11	20.67	21.14
		Gas			4.4	5	4.95	6.4	6.4	6.8	7	7.3	8.5
Overall Dimensions	Length			mm	3800	3820	3810	3820	3840	3840	4340	4340	4810
	Width				1966	2125	2230	2344	2561	2561	2554	2707	2834
	Height				2332	2351	2349	2411	2496	2544	2564	2807	2897
Operating Weight				t	6.7	7.8	8.9	9.5	10.3	11	11.8	12.2	14.3
Shipping Weight					8.2	9.6	11.1	12.2	13.6	14.5	15.6	16.5	20.3

496H2	579H2	661H2	744H2	827H2	992H2	1157H2	1323H2	1488H2	1653H2	1984H2	2646H2	3307H2
1740	2040	2330	2620	2910	3490	4070	4650	5230	5820	6980	9300	11630
150	175	200	225	250	300	350	400	450	500	600	800	1000
496	579	661	744	827	992	1157	1323	1488	1653	1984	2646	3307
120	140	160	180	200	240	280	320	360	400	480	640	800
12 → 7												
56 → 60 (50 → 60)												
300(120)	350(140)	400(160)	450(180)	500(200)	600(240)	700(280)	800(320)	900(360)	1000(400)	1200(480)	1600(640)	2000(800)
3.8(0.61)	4.1(0.66)	4.9(0.79)	6.6(1.06)	6.4(1.03)	8.4(1.35)	8.1(1.30)	8.8(1.41)	12.4(1.99)	11.8(1.89)	2.6(0.42)	5.0(0.6)	7.5(1.1)
200	200	250	250	250	300	300	350	350	350	400	400	450
32 → 38												
424	495	565	636	707	848	989	1130	1272	1413	1696	2264	2830
6.6	6.8	8.7	9.6	9.1	11.1	11	5.2	6.2	6.6	8.6	12	16
250	250	250	250	300	350	350	400	400	400	450	500	600
106.7	124.4	142.2	160	177.8	213.3	248.9	284.4	320	355.5	426.6	568.8	711
123	143.5	164	184.5	205	246	287	328	369	410	492	656	820
1"											2-1"	
111	129.5	148	166.5	185	222	259	296	333	370	444	592	740
128	149.3	170.6	191.9	213.3	255.9	298.6	341.2	383.9	426.5	511.8	682.4	853
2"											2-2"	
316.9	369.7	422.5	475.4	528.2	633.8	739.4	845.1	950.7	1056.3	1267.6	1690.4	2113
365.5	426.4	487.3	548.2	609.1	731	852.8	974.6	1096.5	1218.3	1462	1949.6	2437
800-3000			1100~3000			1300~3000			1500~3000			
80	100				125			150			2-125	2-150
100.8	117.6	134.4	151.3	168.1	201.7	235.3	268.9	302.5	336.1	403.3	537.6	672
116.3	135.7	155.1	174.4	193.8	232.6	271.3	310.1	348.9	387.6	465.2	620	775
400~3000	550~3000		800~3000			1000~3000			1200~3000			
65					80			100		125	2-80	2-100
1620	1890	2160	2430	2700	3240	3780	4320	4860	5400	6480	8850	11000
1860	2170	2480	2790	3100	3720	4340	4960	5580	6200	7440	9950	12500
300×500	300×500	360×550	360×550	400×600	420×700	420×700	550×750	550×750	550×750	650×800	2-550×750	
3Φ - 380VAC - 50Hz												
28.9	28.9	30.8	43.5	43.5	58.6	59.5	62.5	62.5	68.3	90.5	123.1	134.7
48.8	50.8	50.8	61.1	62.1	71	89.6	91.3	91.6	111.4	124.4	180.7	220.9
28.9	28.9	30.8	41	41	55.8	57.5	60.5	76.5	82.3	83.4	119.1	162.7
11.8	11.8	12.8	17.9	17.9	24.6	25.1	26.1	24.6	24.6	41.45	50.8	50.8
22.48	22.95	24.1	28.19	28.1	33.71	44	46.24	46.43	48.57	56.29	91.73	96.39
11.4	11.4	12.4	16.9	16.9	23.6	24.1	25.1	32.1	33.6	33.1	48.8	65.8
4885	4885	5308	5725	5960	7230	7230	7230	7930	7960	9150	9850	11580
3120	3170	3220	3400	3374	3900	4050	4357	4362	4629	4652	4960	5220
3034	3150	3218	3221	3320	3441	3720	3864	3864	4214	4224	5160	5160
16.7	18.2	20.8	22	26	31.8	36.2	41.2	43.9	51.1	59.3	89.6	115.2
23.4	25.1	28.9	31.1	36.3	45.1	51.5	58.4	62	71.6	84.3	113	145.2

Note

(1) Values for chilled/heated/cooling water in above table are for nominal conditions and can be properly adjusted in actual operation.

(2) The lowest outlet temperature of chilled water is 5℃

(3) Chilled/Heated water can be adjusted in range of 60~120%.

(4) On the chilled/heated/cooling water side, scale factor is 0.086m^2K/kW (0.0001m^2·h·℃/kcal).

(5) Cooling/Heating capacity can be adjusted in range of 30~105% for Oil-fired type, 25~105% for Gas-fired type.

(6) Nominal discharge temperature of flue gas: 170℃ for cooling mode, 155℃ for heating mode.

(7) The maximum chilled/heated/cooling water box pressure bearing capacity of normal pressure chiller is 0.8 MPa(G).

(8) Heat values indicated in the table are low heat values.

(9) Consumption of fuel not indicated in the table can be calculated=Low heat value indicated in the table/Low heat value of adopted fuel×consumption indicated in the table.

(10) Gas inlet pressure indicated in the table is the pressure at the outlet of ball valve then the chiller is under operation..

(11) Gas Relative Density = Gas density/Air density

(12) Overall dimensions indicated in the table include rack dimensions.

(13) The shipping weight includes the rack weight, exluding solution weight.

(14) When referring to Chilled/Heated Water sub-region, data indicated in the round brackets are parameters in heating mode with inlet/outlet temperature difference as 10℃.

3 Steam-Operated Double Effect Lithium Bromide Absorption Chiller

H2-type steam operated double effect lithium bromide absorption chiller is a kind of large-size industrial facility with steam as the driving energy and lithium bromide solution as the absorbent and water as refrigerant.

H2-type steam operated double effect units, using steam as the energy source, not only reduces greatly the cost for electricity and operation fees in regions where there are rich steam resources, but also compensates the peak-valley load difference. When the hot summer rolls in, shortage of electric power will poses a great worry for various cities. Concentrated consumption of power by air-conditioners is the sticking point for such a seasonal problem, for which, H2-type steam operated double effect chillers offer an attractive solution.

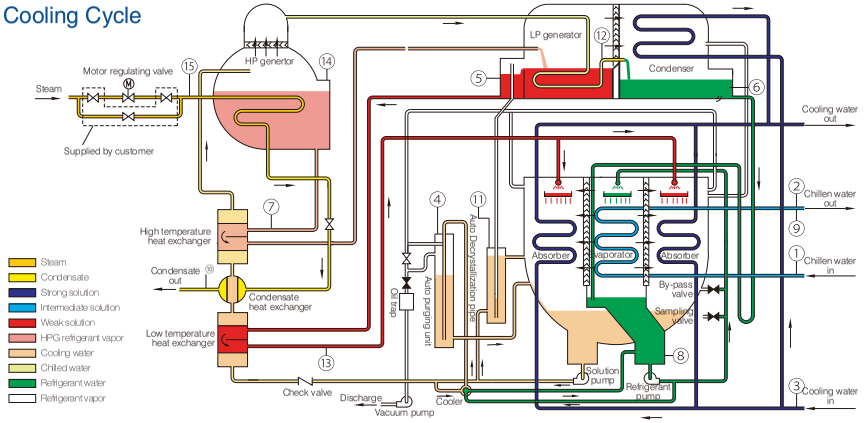
The most attractive feature of Shuangliang H2-type steam operated double effect chiller is its stunning performance in energy saving. High COP of 1.33 and provenly high efficiency rank Shuangliang H2-type steam operated chiller in the leading position worldwide.

Shuangliang H2-type steam operated double effect chillers are widely applied in industries, such as precision machinery manufacturing, instruments & meters, aviation & aerospace, textiles, electronics, electric power, metallurgy, pharmaceuticals, cigarettes, chemicals, hospitals, food, etc. By utilizing dozens of patented technologies with features of extremely high energy efficiency and outstanding environmental effects, in addition to her customer service experience of over 25 years, Shuangliang guarantees to reward her users with optimal returns.

Working Principle

The steam operated double effect LiBr absorption chiller uses steam as the energy, LiBr solution as absorbent, and water as refrigerant. It consists of major parts such as high pressure generator, low pressure generator, condenser, evaporator, absorber, high and low temperature heat exchangers, condensate heat exchanger, etc., as well as auxiliary parts such as canned motor pumps (solution pump and refrigerant pump), vacuum pump and purging unit. It is a combination of shell and tube heat exchangers. It is operated under vacuum conditions by vacuum pump and purging unit.

Cooling Cycle



① Chilled water inlet temp. (I)
② Chilled water outlet temp. (C,I,A)
③ Cooling water inlet temp. (C,I,A)
④ Auto-purging unit pressure (I)
⑤ Low pressure generator Strong solution temp. (C,I)
⑥ Condensation temp. (C,I,A)
⑦ High pressure generator intermediate solution temp. (I,A)
⑧ Evaporation temp. (I,A)
⑨ Chilled water flow (A)
⑩ Steam condensate temp. (I)
⑪ De-crystallization pipe temp. (I,A)
⑫ High pressure generator pressure(C,I,A)
⑬ Strong solution spray temp. (C,I)
⑭ High pressure generator solution level(C,I)
⑮ Steam pressure (C,I,A)

(C)—Control
(A)—Alarm
(I)—Indication

Special Features of Cooling Cycle

Evaporator Water to be chilled of 12℃ is supplied into the tubes of evaporator, and cooled to 7℃ by the sprayed refrigerant, and returns to the external system. Refrigerant gains the heat from the chilled water of external system, and becomes vapor, which enters the absorber.

Absorber LiBr solution, as an absorbent, possesses strong absorbing capacity to water vapor and is sprayed on the heat-exchanging tubes of the absorber to absorb the vapor generated in the evaporator and is then diluted. Heat of solution (i.e. heat from the chilled water of external system) is carried away by the cooling water from the cooling tower through heat exchange tubes in the absorber, and weak solution collects under the bottom of the absorber. After being purged by solution pump and heated in the heat exchanger, it enters the HPG.

High Pressure Generator (hereinafter HPG) Large quantity of vapor is generated by heating the solution with high-temperature steam and meanwhile the solution is concentrated into intermediate solution, which enters the low pressure generator after being cooled down through high-temperature heat exchanger. The refrigerant vapor is also fed into the low pressure generator.

Low Pressure Generator (hereinafter LPG) The intermediate solution, which is cooled down and enters the LPG, is once again heated by vapor from HPG. The solution is further concentrated. The strong solution flows back to the absorber after being cooled down through heat-exchanging in the low-temperature heat exchanger. The vapor thus generated enters the condenser. The vapor from HPG is condensed to water after heating the solution and enters the condenser through throttle.

Condenser: Cooling water flows through tubes in the condenser and condenses the vapor outside the tubes into refrigerant water. The produced refrigerant water enters the evaporator through U pipe as refrigerant element for refrigeration.

LT Heat Exchanger Low temperature heat exchanger is used to exchange heat between the solution from LPG and weak solution from absorber to increase the temperature of diluted solution and thus to recover the heat of strong solution.

Condensate heat exchanger Heat exchanging between working steam condensate and weak solution after being heated in LT heat exchanger further increase the temperature of the weak solution.

HT Heat Exchanger High temperature heat exchanger is used to exchange heat between the intermediate solution from HPG and the weak solution after being heated in the low temperature heat exchanger, to further increase the temperature of weak solution.
Heat exchangers are used to decrease the heat consumption in the HPG and reduce the cooling water load required for lowering the temperature of strong solution, which is vital to the energy-saving efficiency of the unit.

Technical Specifications

Table of Technical Parameters(0.8MPa) (SI)

Model		ST-	99H2H	132H2H	165H2H	198H2H	231H2H	265H2H	298H2H	331H2H	413H2H	496H2H
Cooling Capacity		kW	350	470	580	700	810	930	1050	1160	1450	1740
		10^4kcal/h	30	40	50	60	70	80	90	100	125	150
		USRt	99	132	165	198	231	265	298	331	413	496
Chilled Water	Inlet/outlet Temp.	℃	12 → 7									
	Flow Rate	m^3/h	60	80	100	120	140	160	180	200	250	300
	Pressure Loss	mH_2O	5.5	5.5	5.7	5.8	7.8	7.3	7.9	10.9	11	5.5
	Connection Diameter(DN)	mm	100	100	125	125	150	150	150	150	200	200
Cooling Water	Inlet/outlet Temp.	℃	32 → 38									
	Flow Rate	m^3/h	85	113	142	170	198	227	255	283	354	425
	Pressure Loss	mH_2O	7.2	6.9	7	7.4	9	8.9	8.5	6	6.6	8.4
	Connection Diameter(DN)	mm	100	125	150	150	150	150	200	200	200	250
Steam	Consumption	kg/h	372	496	620	744	868	992	1116	1240	1550	1860
	Steam Condensate Temp.	℃	≤95									
	Steam Condensate Back Pressure(G)	MPa	≤0.05									
	Steam Pipe Diameter(DN)	mm	40	50	50	50	65	65	65	65	80	80
	Electric Modulating Valve Dia.(DN)	mm	40	40	40	40	40	50	50	50	65	65
	Steam Condensate Pipe Diameter(DN)	mm	25	25	25	25	25	32	32	32	32	40
Electrical Data	Power Supply		3Φ - 380VAC - 50Hz									
	Total Current	A	8	10	10	10	17.3	17.3	20.3	20.8	20.8	21.8
	Electric Power	kW	3.8	4.1	4.1	4.1	5.9	5.9	6.8	7	7	7.2
Overall Dimensions	Length	mm	3810	3810	3790	3790	3820	3840	3890	4357	4357	4895
	Width		1942	2027	2060	2060	2183	2308	2355	2332	2450	2558
	Height		2152	2170	2169	2217	2231	2316	2364	2384	2702	2717
Operating Weight		t	6.4	6.9	7.3	7.9	8.3	9	9.6	10.1	11	13.1
Shipping Weight			7.7	8.5	9.1	9.8	10.3	11.4	12.1	13.4	14.6	17.4

Model		ST-	579H2H	661H2H	744H2H	827H2H	992H2H	1157H2H	1323H2H	1488H2H	1653H2H	1984H2H
Cooling Capacity		kW	2040	2330	2620	2910	3490	4070	4650	5230	5820	6980
		10^4kcal/h	175	200	225	250	300	350	400	450	500	600
		USRt	579	661	744	827	992	1157	1323	1488	1653	1984
Chilled Water	Inlet/outlet Temp.	℃	12 → 7									
	Flow Rate	m^3/h	350	400	450	500	600	700	800	900	1000	1200
	Pressure Loss	mH_2O	5.2	5.3	6.1	8.2	8.1	11.5	10.5	11.1	15.3	14.1
	Connection Diameter(DN)	mm	200	250	250	250	300	300	350	350	350	400
Cooling Water	Inlet/outlet Temp.	℃	32 → 38									
	Flow Rate	m^3/h	496	567	638	709	850	992	1134	1275	1417	1700
	Pressure Loss	mH_2O	8.1	8.7	10.2	10.8	11.2	14.3	14.1	5.9	7.6	6.9
	Connection Diameter(DN)	mm	250	250	250	300	300	350	350	400	400	450
Steam	Consumption	kg/h	2170	2480	2790	3100	3720	4340	4960	5580	6200	7440
	Steam Condensate Temp.	℃	≤95									
	Steam Condensate Back Pressure(G)	MPa	≤0.05									
	Steam Pipe Diameter(DN)	mm	80	80	100	100	100	125	125	150	150	150
	Electric Modulating Valve Dia.(DN)	mm	65	80	80	80	80	100	100	100	125	65
	Steam Condensate Pipe Diameter(DN)	mm	40	40	40	40	50	50	50	65	65	65
Electrical Data	Power Supply		3Φ - 380VAC - 50Hz									
	Total Current	A	22.8	22.8	22.8	28.6	33	33	36.6	37.6	49.4	49.4
	Electric Power	kW	7.5	7.5	7.5	9	9.5	9.5	12	12.5	13.9	15
Overall Dimensions	Length	mm	4918	4918	5308	5805	5795	6525	6525	6813	7513	7570
	Width		2740	2760	2815	2800	2930	3209	3334	3354	3354	3756
	Height		2854	2970	3038	3041	3335	3381	3669	3804	3804	4254
Operating Weight		t	14.5	16.2	16.8	20.2	24.2	26.6	31.5	33	39	46
Shipping Weight			20	21.9	22.8	28.4	33.4	37.2	44.2	48	54.7	64.2

Notes

(1) Values for steam,chilled water and cooling water in above table are for nominal conditions and can be properly adjusted in actual operation. With the inlet/outlet temperature of cooling water as 30℃/36℃, the steam consumption is only 12.2kg/(10^4kcal/h), and the COP value is 1.43.

(2) Steam pressure 0.8 Mpa(G) refers to the inlet pressure without any valve pressure loss. The lowest outlet temperature of chilled water is 5℃

(3) Cooling capacity can be adjusted in range of 20~100% , and chilled water can be adjusted in range of 60~120%.

(4) On the chilled water/cooling water side, scale factor is 0.086m^2K/kW (0.0001m^2·h℃/kcal).

(5) The maximum chilled/cooling water box pressure bearing capacity of normal pressure chiller is 0.8 MPa(G).

(6) The unit is transported with rack of 180mm in height, and for the units ST-992H2H and above, submerged type rack will be adopted, extra 60mm shall be included.

(7) The shipping weight includes the rack weight, exluding solution weight.

Table of Technical Parameters (0.6MPa) (SI)

Model		ST-	99H2	132H2	165H2	198H2	231H2	265H2	298H2	331H2	413H2	496H2	579H2
Cooling Capacity		kW	350	470	580	700	810	930	1050	1160	1450	1740	2040
		10^4kcal/h	30	40	50	60	70	80	90	100	125	150	175
		USRt	99	132	165	198	231	265	298	331	413	496	579
Chilled Water	Inlet/outlet Temp.	℃	12 → 7										
	Flow Rate	m^3/h	60	80	100	120	140	160	180	200	250	300	350
	Pressure Loss	mH_2O	4.4	4.5	4.7	5.7	5.6	6.2	8.8	8.8	3.8	3.8	4.1
	Connection Diameter(DN)	mm	100	100	125	125	150	150	150	150	200	200	200
Cooling Water	Inlet/outlet Temp.	℃	32 → 38										
	Flow Rate	m^3/h	86	114	143	172	200	229	257	286	357	429	500
	Pressure Loss	mH_2O	6.6	6.3	6.5	7	7.6	7.8	5.4	5.4	7.2	6.6	6.9
	Connection Diameter(DN)	mm	100	125	150	150	150	150	200	200	200	250	250
Steam	Consumption	kg/h	376	501	627	752	877	1003	1128	1253	1566	1880	2193
	Steam Condensate Temp.	℃	≤90										
	Steam Condensate Back Pressure(G)	MPa	≤0.05										
	Steam Pipe Diameter(DN)	mm	40	50	50	65	65	65	65	80	80	80	80
	Electric Modulating Valve Dia.(DN)	mm	40	40	40	50	50	50	50	65	65	65	80
	Steam Condensate Pipe Diameter(DN)	mm	25	25	25	25	32	32	32	32	40	40	40
Electrical Data	Power Supply		3Φ - 380VAC - 50Hz										
	Total Current	A	8	10	10	17.3	17.3	20.3	20.8	20.8	21.8	22.8	22.8
	Electric Power	kW	3.8	4.1	4.1	5.9	5.9	6.8	7	7	7.2	7.5	7.5
Overall Dimensions	Length	mm	3810	3810	3790	3820	3840	3840	4357	4357	4855	4918	4918
	Width		1942	2027	2060	2183	2308	2355	2332	2450	2558	2740	2760
	Height		2152	2170	2169	2231	2316	2364	2384	2627	2717	2854	2970
Operating Weight		t	6.5	7.1	7.5	8.1	9	9.4	10.1	10.5	12.8	14.5	15.6
Shipping Weight			7.8	8.7	9.3	10.1	11.4	11.9	13.4	14	17.1	20	21.3

Model		ST-	661H2	744H2	827H2	992H2	1157H2	1323H2	1488H2	1653H2	1984H2	2646H2	3307H2
Cooling Capacity		kW	2330	2620	2910	3490	4070	4650	5230	5820	6980	9300	11630
		10^4kcal/h	200	225	250	300	350	400	450	500	600	800	1000
		USRt	661	744	827	992	1157	1323	1488	1653	1984	2646	3307
Chilled Water	Inlet/outlet Temp.	℃	12 → 7										
	Flow Rate	m^3/h	400	450	500	600	700	800	900	1000	1200	1600	2000
	Pressure Loss	mH_2O	4.9	6.6	6.4	8.4	8.1	8.8	12.4	11.8	2.6	5	7.5
	Connection Diameter(DN)	mm	250	250	250	300	300	350	350	350	400	400	450
Cooling Water	Inlet/outlet Temp.	℃	32 → 38										
	Flow Rate	m^3/h	572	643	715	858	1001	1144	1287	1430	1716	2288	2860
	Pressure Loss	mH_2O	8.8	9.8	9.2	11.3	11.2	5.2	6.3	6.7	8.7	12	16
	Connection Diameter(DN)	mm	250	250	300	350	350	400	400	400	450	500	600
Steam	Consumption	kg/h	2506	2819	3133	3759	4386	5012	5639	6265	7518	10024	12530
	Steam Condensate Temp.	℃	≤90										
	Steam Condensate Back Pressure(G)	MPa	≤0.05										
	Steam Pipe Diameter(DN)	mm	100	100	100	125	125	150	150	150	150	200	200
	Electric Modulating Valve Dia.(DN)	mm	80	80	100	100	100	125	125	125	150	150	200
	Steam Condensate Pipe Diameter(DN)	mm	40	40	50	50	50	65	65	65	6 5	80	100
Electrical Data	Power Supply		3Φ - 380VAC - 50Hz										
	Total Current	A	22.8	28.6	28.6	33	36.6	37.6	37.6	49.4	49.4	71.8	95.4
	Electric Power	kW	7.5	9	9	9.5	12	12.5	12.5	13.9	15	23.6	26.4
Overall Dimensions	Length	mm	5308	5733	5795	6525	6525	6813	7513	7513	9118	9500	11580
	Width		2815	2800	2930	3209	3334	3354	3354	3756	3766	4400	4400
	Height		3038	3041	3260	3381	3669	3804	3804	4154	4164	5100	5100
Operating Weight		t	16.8	18.6	22	26.6	30	33	36.5	43.6	51	76	103
Shipping Weight			22.8	26.8	31.1	37.2	42.7	48	52.2	61.8	72.7	94	125

Notes

(1) Values for steam,chilled water and cooling water in above table are for nominal conditions and can be properly adjusted in actual operation. With the inlet/outlet temperature of cooling water as 30℃/36℃, the steam consumption is only 12.35kg/(10^4kcal/h), and the COP value is 1.41.

(2) Steam pressure 0.6 Mpa(G) refers to the inlet pressure without any valve pressure loss. The lowest outlet temperature of chilled water is 5℃

(3) Cooling capacity can be adjusted in range of 20~100% , and chilled water can be adjusted in range of 60~120%.

(4) On the chilled water/cooling water side, scale factor is 0.086m^2K/kW (0.0001m^2·h·℃/kcal).

(5) The maximum chilled/cooling water box pressure bearing capacity of normal pressure chiller is 0.8 MPa(G).

(6) The unit is transported with rack of 180mm in height, and for the units ST-827H2 and above, submerged type rack will be adopted, extra 60mm shall be included.

(7) The shipping weight includes the rack weight, exluding solution weight.

Table of Technical Parameters (0.4MPa) (SI)

Model		SXZ4-	83H2L	99H2L	132H2L	165H2L	198H2L	231DH2L	265H2L	331H2L	413H2L	496H2L	579H2L	661H2L	827H2L	992H2L	1157H2L	1323H2L
Cooling Capacity		kW	290	350	470	580	700	810	930	1160	1450	1740	2040	2330	2910	3490	4070	4650
		10^4kcal/h	25	30	40	50	60	70	80	100	125	150	175	200	250	300	350	400
		USRt	83	99	132	165	198	231	265	331	413	496	579	661	827	992	1157	1323
Chilled Water	Inlet/Outlet Temp.	℃	12→ 7															
	Flow Rate	m^3/h	50	60	80	100	120	140	160	200	250	300	350	400	500	600	700	800
Cooling Water	Inlet/Outlet Temp.	℃	32 →38															
	Flow Rate	m^3/h	72	86	115	144	173	202	230	288	360	432	504	576	720	864	1008	1152
Steam	Consumption	kg/h	319	383	510	638	765	893	1020	1275	1594	1913	2231	2550	3188	3825	4463	5100
	Steam condensate Temp.	℃	≤85															
	Steam Condensare Back Pressure(G)	MPa	≤0.05															
Electrical Data	Power Supply		3Φ - 380VAC - 50Hz															

Notes

(1) Values for steam,chilled water and cooling water in above table are for nominal conditions and can be adjusted in proper actual operation. With the inlet/outlet temperature of cooling water as 30℃/36℃, the steam consumption is only 12.6kg/(10^4kcal/h), and the COP value is 1.38.

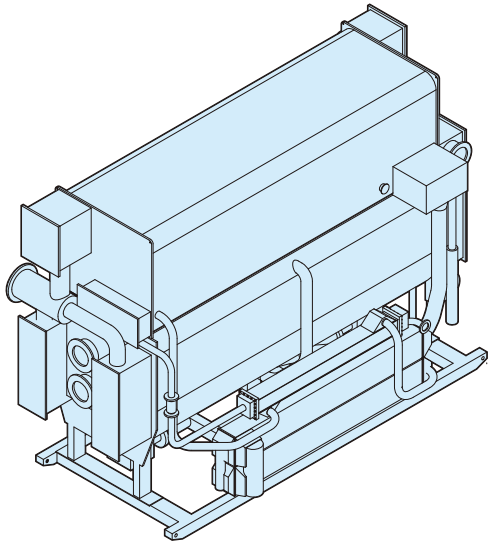
(2) Steam pressure 0.4 Mpa(G) refers to the inlet pressure without any valve pressure loss. The lowest outlet temperature of chilled water is 5℃

(3) Cooling capacity can be adjusted in range of 20~100% , and chilled water can be adjusted in range of 60~120%.

(4) On the chilled water/cooling water side, scale factor is 0.086m^2K/kW (0.0001m^2·h·℃/kcal).

(5) The maximum chilled/cooling water box pressure bearing capacity of normal pressure chiller is 0.8 MPa(G).

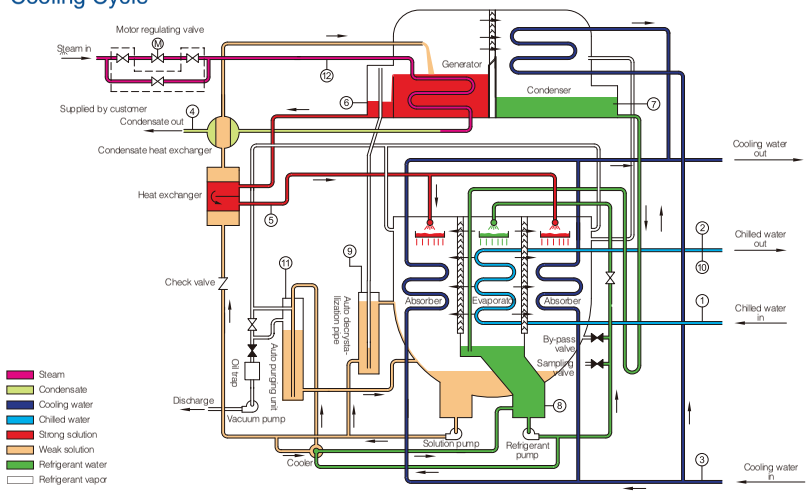
4 Steam-Operated Single Effect Lithium Bromide Absorption Chiller



Steam-operated single effect lithium bromide absorption chiller is a kind of large-size refrigeration facility with low pressure steam as the driving energy and lithium bromide solution as the absorbent and water as refrigerant. Steam single effect chiller, using steam or waste steam as the energy source, not only reduces greatly the cost for electricity but also possess great economic potential in applications where this source of energy is available.

Working Principle

Cooling Cycle



① Chilled water inlet temperature (I)
② Chilled water outlet temperature (I,C,A)
③ Cooling water inlet temperature (I,C,A)
④ Condensate temperature (I)
⑤ Solution spray temperature (I,C)
⑥ Strong solution outlet temperature (I,C,A)
⑦ Condensation temperature (I,C,A)
⑧ Evaporation temperature (I,A)
⑨ De-crystallization temperature (I,A)
⑩ Chilled water flow (A)
⑪ Vacuum pressure (I)
⑫ Steam pressure (I,C,A)
(I)—Indication
(C)—Control
(A)—Alarm

Special Feature of Cooling Cycle

Lithium bromide solution is absorbent and water is refrigerant. As we know Water is vaporized at low boiling point in deep vacuum. It is the feature that is used in our chiller to absorb heat and to realize cooling effect.

Chiller is pumped into deep vacuum by vacuum pump, which creates the necessary condition for boiling of water at low temperature. The resulting refrigerant vapor is attracted to the absorber by the pressure difference between absorbers and evaporator and then absorbed by strong lithium bromide solution and therefore performs continuous boiling of refrigerant water.

In steam operated single effect chiller, weak solution in absorber is pumped into generator via heat exchangers by solution pump and then concentrated into strong solution when heated by steam. Refrigerant vapor generated at the same time is condensed into water in condenser. Resulting latent heat is carried out of chiller by cooling water.

Refrigerant water enters evaporator and then is pumped to spray through spraying device by refrigerant pump.

The transfer of heat from the system water to the refrigerant causes the refrigerant water to vaporize again, producing chilled water (cooling source provided by the chiller). Strong solution directly enters absorber via heat exchangers and spray on heat exchanging tubes of absorber through dispersion trays. As refrigerant vapor is absorbed by the solution, strong solution is diluted and heat is generated and rejected to the cooling water flowing in the absorber tubes.

In cooling cycle, Lithium bromide solution is circulated between strong and weak concentration and refrigerant is changed between liquid state and gaseity. These two cycles carry out simultaneously and go round and round.

Heat exchanger is a sort of heat-exchanging equipment between high and low temperature solution. In steam single effect chiller, there is still a condensate heat exchanger, in which heat is exchanged between strong and weak solution, therefore, increasing the heat efficiency of chiller.

Technical Specifications

	Model	SS-	99H2	165H2	265H2	331H2	413H2	496H2	579H2	661H2	744H2	827H2	992H2	1157H2	1323H2
	Cooling Capacity	kW	350	580	930	1160	1450	1740	2040	2330	2620	2910	3490	4070	4650
		10^4kcal/h	30	50	80	100	125	150	175	200	225	250	300	350	400
		USRt	99	165	265	331	413	496	579	661	744	827	992	1157	1323
Chilled Water	Inlet/outlet Temp.	℃	12 → 7												
	Flow Rate	m^3/h	60	100	160	200	250	300	350	400	450	500	600	700	800
	Pressure Loss	mH_2O	5.5	5.4	5.4	8.2	3.5	3.5	3.5	4.6	5.8	5.8	7.9	8.1	8.1
	Connection Diameter(DN)	mm	100	125	150	150	200	200	200	250	250	250	300	300	350
Cooling Water	Inlet/outlet Temp.	℃	32 → 40												
	Flow Rate	m^3/h	85	141	227	283	354	425	495	566	637	708	863	991	1132
	Pressure Loss	mH_2O	8.5	8	8	10.7	8.9	8.4	8.4	10.6	6.5	6.5	7.9	8	8
	Connection Diameter(DN)	mm	100	150	200	200	200	250	250	250	300	300	350	350	400
Steam	Pressure(G)	MPa	0.1												
	Consumption	kg/h	690	1114	1840	2300	2875	3450	4025	4600	5175	5750	6900	8050	9200
	Steam Condensate Temp.	℃	≤90												
	Steam Condensate Back Pressure(G)	MPa	≤0.02												
	Steam Pipe Diameter(DN)	mm	100	125	150	150	200	200	200	250	250	300	300	300	300
	Steam Condensate Pipe Diameter(DN)	mm	25	25	40	40	40	50	50	50	65	65	65	80	80
Electrical Data	Power Supply		3Φ - 380VAC - 50Hz												
	Total Current	A	8	10	20.3	20.8	21.8	22.8	22.8	22.8	28.6	28.6	33	36.6	37.6
	Electric Power	kW	3.8	4.1	6.8	7	7.2	7.5	7.5	7.5	9	9	9.5	12	12.5
Overall Dimensions	Length	mm	3950	3900	4020	4475	5180	5218	5200	5650	5960	6083	6695	6715	6855
	Width		1592	1802	2048	2135	2410	2418	2626	2519	2521	2576	2895	3203	3215
	Height		2346	2438	2753	2804	2980	3226	3364	3381	3425	3683	3759	4100	4495
	Operating Weight	t	7.3	8.8	11	13.1	15.7	18.1	20.5	23.4	24.9	27.4	32.4	37.1	41.3
	Shipping Weight		6	6.8	8.3	9.9	11.8	13.4	14.9	17.2	18	19.9	23.2	26.5	29.1

Notes

(1) Values for steam,chilled water and cooling water in above table are for nominal conditions and can be properly adjusted in actual operation.
(2) The lowest outlet temprature of chilled water is 5℃.
(3) Cooling capacity can be adjusted in range of 20~100% , and chilled water can be adjusted in range of 60~120%.
(4) On the chilled water/cooling water side, scale factor is 0.086m^2K/kW (0.0001m^2·h·℃/kcal).
(5) The maximum chilled/cooling water box pressure bearing capacity of normal pressure chiller is 0.8 MPa(G).
(6) The unit is transported with rack of 180mm in height, and for the units SS-661H2 and above, submerged type rack will be adopted, extra 60mm shall be included.
(7) The shipping weight includes the rack weight, exluding solution weight.

5 Hot Water Operated Two Stage Lithium Bromide Absorption Chiller

Hot water operated two stage lithium bromide absorption chiller is a kind of large-size industrial facility with hot water as the driving energy and lithium bromide solution as the absorbent and water as refrigerant.

Hot water two stage units, using hot water as the energy source, not only reduces greatly the cost for electricity and operation fees in regions where there are rich hot water resources, but also compensates the peak-valley load difference. When the hot summer rolls in, shortage of electric power will poses a great worry for various cities. Concentrated consumption of power by air-conditioners is the sticking point for such a seasonal problem, for which, hot water operated two stage chillers offer an attractive solution.

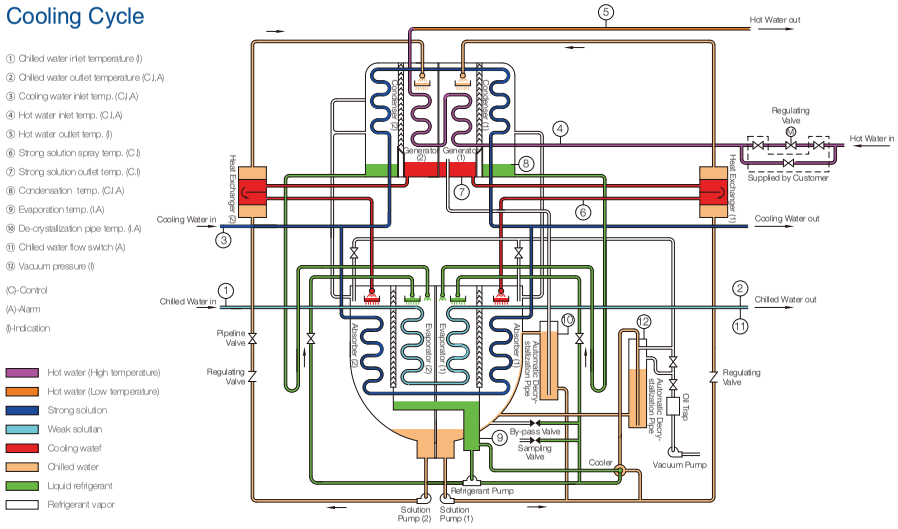
Shuangliang hot water operated two stage chillers are widely applied in industries, such as precision machinery manufacturing, instruments & meters, aviation & aerospace, textiles, electronics, electric power, metallurgy, pharmaceuticals, cigarettes, chemicals, hospitals, food, etc. By utilizing dozens of patented technologies with features of extremely high energy efficiency and outstanding environmental effects, in addition to her customerservice experience of over 25 years, Shuangliang guarantees to reward her users with optimal returns.

Working Principle

Cooling Cycle

① Chilled water inlet temperature (I)
② Chilled water outlet temperature (C,I,A)
③ Cooling water inlet temp. (C,I,A)
④ Hot water inlet temp. (C,I,A)
⑤ Hot water outlet temp. (I)
⑥ Strong solution spray temp. (C,I)
⑦ Strong solution outlet temp. (C,I)
⑧ Condensation temp. (C,I,A)
⑨ Evaporation temp. (I,A)
⑩ De-crystallization pipe temp. (I,A)
⑪ Chilled water flow switch (A)
⑫ Vacuum pressure (I)

(C)-Control
(A)-Alarm
(I)-Indication



Special Feature of Cooling Cycle

The absorption chiller uses aqueous lithium bromide solution as absorbent, and water as refrigerant, which is evaporated under high vacuum to absorb heat and produce cooling effect.

First, the chiller is evacuated to high vacuum by vacuum pump to create the necessary conditions for water evaporation under low temperature. The resulting refrigerant vapor was attracted to the absorber by the pressure difference between absorber and evaporator, then absorbed by concentrated lithium bromide solution. Thus provides the possibility of continuous evaporation of refrigerant water.

Hot water operated two stage lithium bromide absorption chiller can produce chilled water with outlet temperature of 7℃ (inlet temperature of 12℃ under conditions of hot water inlet temperature of 130℃, maximum temperature difference of hot water of 62℃, hot water outlet temperature of 68℃, cooling water inlet and outlet temperature of 32℃ and 38℃ respectively.

The chiller consists of generators, condenser, absorber, heat exchanger, and hermetically sealed pumps and vacuum pump. One of the hermetically sealed pumps used as solution pump, which transfers the weak solution from the absorber to generator through heat exchanger, and concentrated to strong solution in generator, and refrigerant vapor is produced. Refrigerant vapor is condensed to form condensate, and latent heat is rejected by cooling water.

Refrigerant water is sprayed in the evaporator through dripping plate. Refrigerant water is evaporated to form refrigerant vapor in the evaporator under high vacuum by the heat supplied by chilled water, and low temperature chilled water is produced (the cold energy supplied by the chiller). Concentrated strong solution is fed through heat exchanger into the absorber, and sprayed over the heat exchange tubes bundles in the absorber to absorb the refrigerant vapor to form weak solution. Meanwhile the absorption heat is transferred to the cooling water.

Refrigeration cycle is realized by two cycles simultaneously and repeatedly: the solution cycle, in which the solution changes from strong to weak state and vice versa; and refrigerant solution, in which the refrigerant is changed from liquid to vapor state and vice versa. Heat exchangers are used to improve the efficiency of chiller by heat exchange between the high and low heat sources.

For hot water operated two stage absorption chiller, there is a pair of generators, condensers, evaporators and absorbers, which form two independently coupled subsystems with refrigerant and solution cycles. In the same time hot water, chilled water and cooling water is connected serially between these systems, and hot water flows against the chilled and cooling water to form counter-current heat exchange.

In order to optimize the generation, condensation, evaporation and absorption processes and use the hot water energy maximally, the rational ratio of distribution of cooling capacity and temperature difference between two subsystems and data ol temperature, pressure and concentration of solution should be selected,

Technical Specifications

Table of Technical Parameters (SI)

Model		HSC(130/68)- HSB(120/68)-	99H2	165H2	265H2	331H2	413H2	496H2	579H2	661H2	744H2	827H2	992H2	1157H2	1323H2	1488H2
Cooling Capacity		kW	350	580	930	1160	1450	1740	2040	2330	2620	2910	3490	4070	4650	5230
		10^4kcal/h	30	50	80	100	125	150	175	200	225	250	300	350	400	450
		USRt	99	165	265	331	413	496	579	661	744	827	992	1157	1323	1488
Chilled Water	Inlet/Outlet Temp.	℃	12 → 7													
	Flow Rate	m^3/h	60	100	160	200	250	300	350	400	450	500	600	700	800	900
	Pressure Loss	mH_2O	13	12.7	10.8	7.1	6.1	8.7	8.9	10.4	10.5	14.3	14	16.1	11.7	13.6
	Connection Diameter(DN)	mm	100	125	150	150	200	200	200	250	250	250	300	300	350	350
Cooling Water	Inlet/Outlet Temp.	℃	32 → 38													
	Flow Rate	m^3/h	114	189	303	378	473	567	662	756	851	945	1134	1323	1512	1701
	Pressure Loss	mH_2O	8.5	8.7	7	9.6	8.8	12.1	10.6	13.3	12.8	10.4	10.3	10.3	13	16.3
	Connection Diameter(DN)	mm	125	150	200	250	250	300	300	300	350	350	400	450	450	450
Hot Water	Inlet/Outlet Temp.	℃	68													
	Consumption(130/68)	t/h	6.1	10.2	16.3	20.4	25.5	30.6	35.7	40.8	45.9	51	61.2	71.4	81.6	91.8
	Consumption(120/68)		7.3	12.2	19.4	24.3	30.4	36.5	42.5	48.6	54.7	60.8	76.9	85.1	97.2	109.4
	Pressure Loss	mH_2O	9.3	9.8	9.3	9.1	9	11.9	11.9	9.6	10	13.3	13.3	11.4	15.6	11.1
	Piping Diameter(DN)	mm	40	50	65	80	80	80	80	100	100	100	125	125	150	150
Electrical Data	Power Supply		3Φ - 380VAC - 50Hz													
	Total Current	A	20.4	23.3	25.5	25.5	28.1	28.7	30.9	30.9	33.4	37.7	41.6	44	45	45.9
	Electric Power	kW	6.55	7.25	7.65	7.65	8.65	9.05	9.45	9.45	10.25	11.25	12.35	13.35	13.95	14.45
Overall Dimensions	Length	mm	4100	4144	4610	5095	5190	5593	5760	6147	6270	7110	7160	7860	8742	9542
	Width		1803	2023	2170	2275	2492	2508	2632	2700	2856	2912	3226	3268	3146	3176
	Height		2489	2698	2900	2857	3151	3234	3480	3654	3852	3816	4090	4225	4350	4350
Operating Weight		t	8.2	10.2	13.4	15.9	17.8	20.4	23.4	25.7	27.5	29.9	34	41.1	47.4	53.3
Shipping Weight			10	12.9	17.1	20.4	23.5	27.3	31.6	34.7	38.5	41.3	47.5	56.7	64.8	73.3

Notes:

(1) The lowest outlet temprature of chilled water is 5℃.

(2) Cooling capacity can be adjusted in range of 20~100% , and chilled water can be adjusted in range of 60~120%.

(3) On the chilled water/cooling water/hot water side, scale factor is 0.086m^3K/kW (0.0001m^2·h·℃/kcal).

(4) Chilled/cooling/hot water boxes have the maximum pressure bearing capacity of 0.8 Mpa(G) for standard type and 1.6 Mpa(G) for High pressure type.

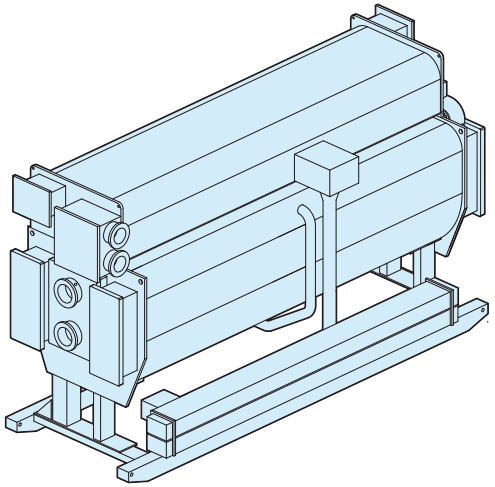
(5) The chiller is transported with rack of 180mm in height for chiller less than unit HSB-413H2, and additional height of rack of 60mm for the unit HSB-496H2 and move.

(6) The shipping weight includes the rack weight, exluding solution weight.balanced during handling.

Technical requirements for lithium bromide solution

Lithium bromide solution is supplied by the Company, and its quality will be higher than that of provision of National standard.

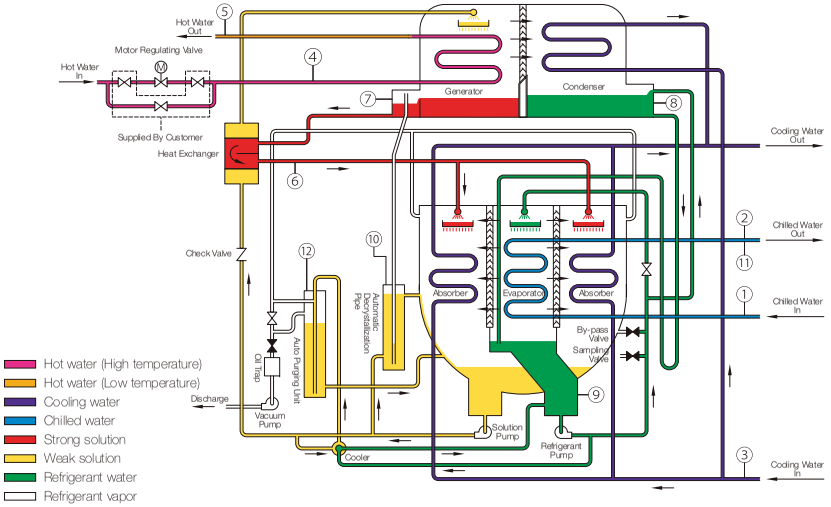
6 Hot Water Operated Single Stage Lithium Bromide Absorption Chiller



Hot water operated single effect lithium bromide absorption chiller is a kind of large-size refrigeration facility with low temperature hot water as the driving energy and lithium bromide solution as the absorbent and water as refrigerant. Hot water single effect chiller, using hot water or waste hot water as the energy source, not only reduces greatly the cost for electricity but also possess great economic potential in applications where this source of energy is available. By using the chiller, waste hot water can be recovered, which used to be discharged or regarded as no use. In addition, hot water single effect chiller uses water as refrigerant instead of CFCs and therefore has no harm to ozone layer, therefore, compared with electric chiller, the machine has an significant advantage of environment preservation.

Working Principle

Cooling Cycle



① Chilled water inlet temp. (I)
② Chilled water outlet temp. (I,C,A)
③ Cooling water inlet temp. (I,C,A)
④ Hot water inlet temp. (I,C,A)
⑤ Hot water outlet temp. (I)
⑥ Solution spray temp. (I,C)
⑦ Strong solution outlet temp. (I,C,A)
⑧ Condensation temp. (I,C,A)
⑨ Evaporation temp. (I,A)
⑩ De-crystallization temp. (I,A)
⑪ Chilled water flow (A)
⑫ Vacuum pressure (I)

(C)—Control
(A)—Alarm
(I)—Indication

Special Feature of Cooling Cycle

Lithium bromide solution is absorbent and water is refrigerant. As we know Water is vaporized at low boiling point in deep vacuum. It is the feature that is used in our chiller to absorb heat and to realize cooling effect.

Chiller is pumped into deep vacuum by vacuum pump, which creates the necessary condition for evaporation of water at low temperature. The resulting refrigerant vapor is attracted to the absorber by the pressure difference between absorber and evaporator and then absorbed by concentrated lithium bromide solution and therefore performs continuous evaporation of refrigerant water.

In hot water operated single effect chiller, weak solution in absorber is pumped into generator via heat exchangers by solution pump and then concentrated into strong solution when heating by hot water.

Refrigerant vapor generated at the same time is condensed into water in condenser. Resulting latent heat is carried out of chiller by cooling water.

Refrigerant water enters evaporator and then is pumped to spray through spraying device by refrigerant pump.

The transfer of heat from the system water to the refrigerant causes the refrigerant water to vaporize again, producing chilled water (cooling source provided by the chiller). concentrated strong solution directly enters absorber via heat exchangers and spray on heat exchanging tubes of absorber through dispersion trays. As refrigerant vapor is absorbed by the solution, strong solution is diluted and heat is generated and rejected to the cooling water flowing in the absorber tubes.

Heat exchanger is a sort of heat-exchanging equipment between high and low temperature solution. In hot water single effect chiller, there is still a heat exchanger, in which heat is exchanged between high temperature strong solution and low temperature weak solution, therefore, increasing the heat efficiency of chiller.

Technical Specifications

	Model	HSA(95/85)-	99H2	165H2	265H2	331H2	413H2	496H2	579H2	661H2	744H2	827H2	992H2	1157H2	1323H2
	Cooling Capacity	kW	350	580	930	1160	1450	1740	2040	2330	2620	2910	3490	4070	4650
		10^6kcal/h	30	50	80	100	125	150	175	200	225	250	300	350	400
		USRt	99	165	265	331	413	496	579	661	744	827	992	1157	1323
Chilled Water	Inlet/Outlet Temp.	℃	15 → 10												
	Flow Rate	m^3/h	60	100	160	200	250	300	350	400	450	500	600	700	800
	Pressure Loss	mH_2O	5.4	5.4	8.2	8.2	11.8	11.8	4.6	5.8	5.8	8.1	8.1	8.1	11.4
	Connection Diameter(DN)	mm	100	125	150	150	200	200	200	250	250	250	300	300	350
Cooling Water	Inlet/Outlet Temp.	℃	32 → 38												
	Flow Rate	m^3/h	112	186	298	372	465	558	651	744	837	930	1116	1302	1488
	Pressure Loss	mH_2O	6.7	6.7	5.1	5.1	6.2	6.7	7.3	8.5	9	10.7	10.7	10.7	14.4
	Connection Diameter(DN)	mm	125	150	200	250	250	250	300	300	300	350	400	400	400
Hot Water	Inlet/Outlet Temp.	℃	95 → 85												
	Consumption	t/h	36.9	61.5	98.4	123	153.8	184.5	215.3	246	276.8	307.5	369	430.5	492
	Pressure Loss	mH_2O	4.3	4.3	3.2	3.2	4.6	4.6	2.5	3.1	3.1	4.2	4.2	4.2	5.9
	Piping Diameter(DN)	mm	80	100	125	150	150	200	200	200	200	200	250	250	250
	Electric Modulating Valve Dia.(DN)	mm	65	80	125	125	150	150	150	200	200	200	250	250	250
Electrical Data	Power Supply		3Φ - 380VAC - 50Hz												
	Total Current	A	9.5	10.7	13.1	14.6	15.8	15.8	15.8	18.8	21.8	21.8	26.9	28.4	31.4
	Electric Power	kW	3.15	3.55	4.35	4.85	5.25	5.25	5.25	6.25	7.25	7.25	8.95	9.45	10.45
Overall Dimensions	Length	mm	3870	3860	4420	4535	5038	5080	5535	5935	5935	6635	6735	6745	7445
	Width		1506	1668	1784	1983	2126	2206	2300	2567	2538	2525	2780	3060	3097
	Height		2239	2541	2711	2860	2860	3080	3195	3315	3460	3460	3770	4170	4170
	Operating Weight	t	7.3	9.3	13	15.2	17.9	21.3	24.8	27.8	30	33.3	39.6	45.5	50.9
	Shipping Weight		5.8	7.1	9.5	10.8	12.7	15	17.7	19.9	21.3	23	27.4	31.3	34.7

Notes

(1) The lowest outlet temprature of chilled water is 5℃.
(2) Cooling capacity can be adjusted in range of 20~100%, and chilled water can be adjusted in range of 60~120%.
(3) On the chilled water/cooling water/hot water side, scale factor is 0.086m^2K/kW (0.0001m^2·h·℃/kcal).
(4) Chilled/cooling/hot water boxes have the maximum pressure bearing capacity of 0.8 MPa(G) for standard type and 1.6 MPa(G) for High pressure type.
(5) The chiller is transported with rack of 180mm in height for chiller less than unit HSA-496H2, and additional height of rack of 60mm for the unit HSA-579H2 and move.
(6) The shipping weight includes the rack weight, exluding solution weight.

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Cat. No.: SL-IT-C1101(E) New Release

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Printed in China Printed on recyclable paper.